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OF TECHNOLOGY BULLETIN

PRESIDENT'S REPORT

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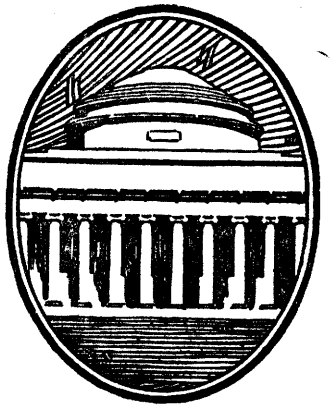

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MASSACHUSETTS INSTITUTE
OF TECHNOLOGY
BULLETIN

President's Report Issue

1946-1947

VOLUME 83 NUMBER 1

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PUBLISHED BY THE INSTITUTE, CAMBRIDGE

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THE ANNUAL REPORT OF THE PRESIDENT

To the Members of the Corporation:

Again I have the privilege of submitting to you a report on the affairs of this institution for which we are proudly responsible. Two years ago I emphasized the Institute's record of war service; last year, its postwar needs and opportunities. This year I shall comment on certain significant trends in higher education as a background for the reports of the President, Treasurer, and other administrative officers on the year's activities.

Status and Trends of Higher Education

This is an opportune time to describe some of the more significant aspects of the status and trends of higher education in the United States, within which our own problems, opportunities, and achievements at M. I. T. may be better understood and evaluated.

If we define higher education as that which goes beyond the high-school level, we find that there are about 1,700 institutions for higher education in the United States. Of these, 400 are junior colleges which do not carry through to the bachelor's degree, 200 are teachers' colleges or normal schools, and 100 are institutions especially for negroes. This leaves about 1,000 institutions which are in the status of colleges, universities, or separate professional and technical schools.

Most of us have been prone to think of the present overcrowded conditions in our institutions as due to the sudden release to college of the great group of young men whose education had been interrupted by military service, this trend to college being aided and abetted by the G. I. Bill of Rights. This is of course true. What is not generally realized, however, is that the present total college enrollment is really not very

far out of line with what it would probably have been if the trends of enrollment during the years prior to 1940 had simply continued uninterruptedly through the war years to 1946. For several decades there has been a steady increase in the number of our young people going on for higher education. If it had not been interrupted by the war and if the prewar curve had been extrapolated through the war years, the total enrollment in institutions of higher learning would be just about what it is today. The difference is that this enrollment has come upon us suddenly after the discontinuity of the war, and our institutions have not been able to adjust themselves to it financially and in facilities and teaching staff so readily as if the growth had proceeded in its gradual, normal manner.

In the past academic year there were a little more than two and a quarter million students enrolled in our institutions of higher learning. This is nearly 60 per cent more than in 1939–1940 and is four times as many as were enrolled immediately after World War I in 1920. The Office of Education estimates that there will be at least three million students in our institutions of higher learning by 1950 and that this number will continue at somewhat like this level until there is another big jump in the 1960's with the increased number of young people who were the war babies of World War II.

On the average, about one in every three high-school graduates now goes on to college. Spot surveys in several parts of the country indicate that less than half of the best of the high-school graduates go on to college and that the principal reason for this low proportion is lack of financial resources.

On the financial side there are some statistics which are quite significant. In the last normal year, 1939–1940, the colleges of the country spent an average of $350 per year per student. This is of course the cost of education and does not include the living costs of the students. The significant fact, however, is that the average annual amount spent by our

colleges per student, reduced to terms of the purchasing power of the dollar, has steadily declined ever since 1930. This fact, combined with the progressively increasing demand for higher education, can mean only that our country has let the pressure for numbers and the competition of other demands upon our national income operate to an over-all decline in the quality of our higher educational program.

One reason for this is the pronounced decrease in private contributions toward higher education and the corresponding increase in support from public funds. In 1920–1921 private contributions amounted to $158 per student, whereas in 1941–1942 they were less than half this amount, namely, $73 per student. The tendency has been to take care of the demand for college education more and more through the tax-supported institutions, and these of necessity have had to cater more to the mass than to the individual. Although only one-third of all the institutions of higher education in the United States are tax supported and under public control, these one-third enroll more than one-half of all the students.

The financial problem confronting the institutions of higher learning is easily understood from the combination of the following factors: (1) the decrease in private contributions, which undoubtedly is due to the higher income-tax rates; (2) the fact that income from invested endowments has decreased by at least a third; (3) the increase in over-all operating costs, including salaries, wages, and costs of material, which have approximately doubled. Add to this the fact that in practically no institution do the tuition fees paid by the students cover the cost of instruction and we have the difficult situation that the increased enrollments result in increased drains on the institutional financial resources.

On the average over the country student fees took care of approximately 40 per cent of the cost of instruction in 1939–1940, but at the present time this average has risen to 56 per

cent. In other words, the colleges, faced with the financial dilemma, have been forced to meet at least part of their financial problem by increases in tuition. In one way I believe that this is generally justified because the average per capita earning power of the American people has approximately doubled in this same period. It is reasonable to expect, therefore, that the average family could take care of twice as much cost of education as it could have in 1939–1940. While the increase in tuition has gone part way toward meeting the financial problem, the institutions are still left with such severe financial handicaps that the average amount of wealth which has been devoted per capita to the education of our young people in schools and colleges has very considerably dropped.

There seem to me to be two major objectives which tend to dominate the direction in which our higher education is moving. Both of these objectives are good and they should be complementary. There is a danger, however, that they may become harmfully competitive. One of these objectives is quantitative and the other is qualitative. Let me explain.

The steadily increasing demand by the public for higher education, combined with the shortage of any other funds for providing this education, has given increasing stimulus to the demand for larger public appropriations. The states are very spotty in their response to this demand. The trend has therefore been toward Federal funds for such support, and the President has recently appointed a commission to make a study of the requirements for higher education and the relationship of the Federal Government to these requirements.

A strong argument can be made for such Federal support on at least three grounds: In the first place, it would meet a public demand. In the second place, it is the only apparent way in which educational opportunities can be more or less equalized for students from various parts of the country. In the third place, the lessons of World War II have emphasized

the importance to our national security of a population which is well educated, not only in the scientific and technical lines but also in the facts of history, economics, and social institutions. I believe, therefore, that it is both proper and inevitable that the Federal Government should step into the breach and sponsor higher education to a substantially greater extent than in the past. It remains to be seen whether such support will be made available on some appropriate basis to all qualified institutions of higher learning or only to existing and to new publicly controlled institutions, and also whether it will be accomplished by outright grants or by some form of contracts.

Both inevitable and proper in the thinking of Federal agencies is the attention to the masses of the population. The ideal will be to make higher education available to all who are qualified to benefit by it, irrespective of race, religion, or economic status, and to contribute as a result of this education to a finer and stronger national life. The young manhood and womanhood of the country will be viewed as raw materials which should be properly developed as national assets.

Freely granting the logic and the benefits of such a program, there are some dangers inherent in it unless certain complementary moves are also made. The most obvious danger is that the entire program of higher education will be brought to a mass level which at the worst could be mediocre and at the best could be rather far from optimum. The complementary factor which is required is attention to a superior type of education, admittedly more expensive and selective than that which can be afforded for the masses, aimed primarily at providing the highest quality of educational advantage for students of superior potential and at the same time providing the best possible type of educational leadership for all higher education. It is possible, if Federal funds are wisely administered, to give proper emphasis to this quality factor as well as to the quantitative factor. This has been notably achieved

already in the case of certain state institutions. Nevertheless, the political factors are against long-term emphasis on quality in state institutions because it is politically difficult to justify under governmental auspices a higher grade of opportunity for one person than for another. The political tendency is always toward equality of distribution.

Here, as I see it, is the great continuing challenge to the privately supported educational institutions. To some of them, at any rate, in every category of liberal arts or professional education, there is the responsibility of providing leadership, and of providing the opportunity for a type of education which is superior to that which can be provided for the masses and which should be made available to those qualified individuals who are able and willing to pay the price as an investment in their future. The existence of such institutions as Harvard, Chicago, M. I. T., and many others is, in the last analysis, the greatest safeguard of higher education against the dangers of political domination. I believe that the continued strength of these great privately controlled institutions will be responsible in no small measure for sustaining the excellent standards and high-minded administration of the majority of the publicly supported institutions.

Lest I be misunderstood, let me amplify the preceding paragraph. I do not argue for an undemocratic special privilege for a favored class. I do argue for freedom of the student to seek special educational opportunities and to profit by them if he is exceptionally qualified. For some students this will be easier than for others, thanks to financial resources which are incentives and rewards of our free enterprise system. But any young man can work, as I and my father before me and thousands of others have done, to earn these opportunities. And the most promising students can be helped by the scholarship and loan funds which so many socially minded people have generously provided for just this purpose.

Critical study of the origins of the basic new discoveries and concepts which underlie so much of our modern civilization points almost startlingly to their origin in countries where highest educational opportunities have been largely concentrated on the most gifted, or most fortunate, among their youth. What we must try to achieve in America is a high level of mass education, which will provide especial opportunity and all possible help for those who combine special gifts for creative scholarship with the earnest ambition to make whatever sacrifices may be necessary to achieve their goal.

To those, therefore, who believe sincerely in free enterprise, in the value of initiative to develop and operate institutions of superior quality, to those who wish to make available such opportunities to the most gifted of our youth, there is a great challenge. Since the most serious problem confronting all institutions is a financial one, the response to this challenge must also be measured in large part in financial terms. What is its magnitude?

The total cost of all higher education in the United States is annually about half of one per cent of our national income, or a little over $800,000,000. For purposes of comparison, this amounts to about one and a half days' expenditure by our country in World War II; or about one-third the amount which is spent annually for operating our entire secondary-school system; or about one-half the estimated cost of operating universal military training for one year. Put another way, $800,000,000 is about five per cent of the amount which the American people spend each year for liquor, tobacco, jewelry, cosmetics, and amusements. The aggregate capital funds held by all institutions of higher learning in the United States are about one and three-quarter billion dollars, or about equal to the total assets of all the great altruistic foundations of the country.

These sums, while large, are small in comparison to the

relative importance of the objective. If the importance of this objective is adequately realized by thoughtful people in the community, it should be easily possible, through private gifts from individuals, foundations, and corporations, to maintain our strategically located private institutions of higher learning in a condition to supply the leadership and the opportunity which are necessary to balance in a wholesome manner the increasing trend toward higher mass education.

In the special fields of science, engineering, and architecture, such leadership is the past tradition and the future objective of the Massachusetts Institute of Technology. To maintain this leadership and this opportunity and to extend it to keep pace with the technological opportunities constitute our problem and in fact our basic reason for existence.

The Year in Review

Turning now specifically to M. I. T., I shall pass in quick review over some of the more significant features of the past year's activities. My comments will be amplified by the reports of our other administrative officers in the full published report.

Our enrollment during the present term will probably reach 5,600 students, an increase of 80 per cent over our stabilized prewar registration. Our total expenditures for the fiscal year 1946–1947 exceeded $17,000,000, over five times our largest prewar budget. Our total personnel, which numbered 1,300 in 1940, has exceeded 3,400 in 1947.

While we do not wish this present overload long to continue at its present level, I believe it fair to say that it has not yet held our figurative nose to the grindstone so completely as to prevent forward-looking activities along with the heavy routine. The past year, in fact, brought steady progress in the retesting and rethinking of the Institute's program and witnessed a mounting interest throughout the Institute in new

ways of enriching our educational work. Creative research has flourished. There is some indication that publication of research results has lagged through lack of time to prepare manuscripts and through the persistence of the wartime habits of reticence.

The Committee on Educational Survey. I spoke in my report last year of the desirability of a strong faculty committee to review our educational policies and procedures. Such a committee has been appointed, together with a group of subcommittees, and has initiated a deeply probing study of those factors which make an educational institution vigorous in scholarship and in spirit. Not only is it reviewing our undergraduate curriculum in the light of our prewar objectives but it is reaching out to consider what the objectives of the future should be in the training of scientists, engineers, and architects. It is giving special attention to the problem of how to take the next step in creating a more effective partnership between the humanities and professional education and in specifying what kind of training will best equip an engineer to handle the great social responsibility and power which must inevitably rest in his hands. And, finally, it is tackling some of the imponderables mentioned above, which promote scholarship and which build citizenship. What, for example, are those factors which we must emphasize in the future to provide the best possible environment for scholarly, creative work by students and staff? This committee includes Professor Warren K. Lewis, chairman, Professor John R. Loofbourow, secretary, and Professors Ronald H. Robnett, C. Richard Soderberg, and Julius A. Stratton.

Concurrently with the study by the Committee on Educational Survey, other approaches to the problem are being followed. The Committee on the Graduate School, under the leadership of Dean J. W. M. Bunker, has reaffirmed and protected our high standards of graduate study while at the same

time it has provided greater flexibility and freedom to the individual student in pursuing his professional objectives. New ways of organizing and coordinating research with teaching have been tested and policies formulated for handling sponsored research to the advantage of the academic program. Throughout the Institute there is clear agreement that the acceptance and priority of any sponsored research program are governed by the extent to which the proposed activity will carry forward the educational objectives of the institution. The acceptance of this principle has been accompanied by the general recognition that our sponsored research programs can, if properly managed, help to create the environment most conducive to scholarship and creative activity.

During the year there has been a fresh and constructive concern with teaching methods throughout the Institute, and several departments have instituted programs for checking and improving the instructional techniques of young staff members. Reflecting the current interest of students in educational methods, one of the student honorary societies has undertaken careful evaluation of individual instructors in selected departments, with the wholehearted collaboration of the departments.

There has been a trend, continuing from before the war, toward deepening engineering education through the adoption of more of the analytical tools of pure science, through more graduate training in engineering, and through the use of research to attract men of imaginative minds. Similarly the science departments have been deepening their programs, and the push, which began in earnest in 1930, to build a great School of Science occupying a position of equal partnership with the School of Engineering, is well on the way to its objective.

During the year, two highly useful additions to our educational facilities were brought into use. One of these, which we acquired by purchase, includes an Army-built struc-

ture and forty-six acres of land in Lexington which will serve as a field station for our Laboratory for Nuclear Science and Engineering. The other is our fine new Gas Turbine Laboratory, which will be dedicated tomorrow and which gives us the most complete gas turbine laboratory to be found in any educational institution.

Broadening Technological Education. I have spoken of the attention being given by the Committee on Educational Survey to the importance of studies in the field of human relations, which we commonly describe as the humanities and the social sciences. Concurrently with the study by this committee, immediate efforts are being made to strengthen our program. Everett Moore Baker, who was appointed Dean of Students on January 1, 1947, and Thomas P. Pitré, who became Dean of Freshmen at that time, are systematically encouraging extracurricular activities and student counseling as effective tools to build citizenship and to widen the outlook of students. They have also developed ways of integrating these extracurricular activities with our humanities studies. For example, we have engaged a new staff member who will not only have charge of our courses in music appreciation but will be consultant to the Dean of Students on our growing student musical activities. The students have responded with instant and hearty appreciation and collaboration. The registration officers in all the professional courses have stepped up their own effective contacts with students, and throughout the Institute, personnel have thrown themselves into the over-all movement to bring students and staff into a community of scholars having the broadest possible outlook.

Contributing importantly and by design to this community building has been the new Director of the Medical Department, Dr. Dana L. Farnsworth, the Institute's first full-time Medical Director. With a background of both psychiatry and internal medicine, he is an ideal successor to Dr. George W. Morse, who

retired after twenty-six years of service. And to serve the general welfare of the students, in close relation to the Office of the Dean of Students and the Medical Department, a full-time Director of Athletics, Ivan J. Geiger, has been engaged and charged with the responsibility of making athletics serve education in the broadest sense. Toward this end he has already greatly stimulated intramural athletics.

Corporation Assistance to Students. The Corporation Committee on Student Activity, headed by Donald F. Carpenter, '22, has been a vigorous and helpful participant in these new developments affecting student life. Based upon a notable report presented by this committee to the Corporation last June, the following resolutions were passed by the Corporation:

> *Resolved,* That it is in the interests of a sound educational program at M. I. T. to provide: (a) Dormitories adequate to accommodate the maximum number of students consistent with the housing needs of the student body and a stabilized enrollment at the Institute. (b) Athletic and recreational facilities adequate to accommodate all reasonable needs of student and faculty members who may wish to use them and to permit intercollegiate competition. (c) Facilities adequate for the conduct of extracurricular activities. (d) Administrative personnel adequate for the guidance and encouragement of student activities and athletics and of a balanced extracurricular program for the student body. (e) Freshman participation in athletics as a part of the educational program.
>
> *Resolved Further,* That maximum benefit from activities, including athletics, will be attained only when the students assume full responsibility for the operation of these activities, the administration and the Alumni Association assisting in an advisory capacity only, except in such cases where more direct action may be required to protect the reputation or properties of M. I. T. or to avoid any possible detrimental effect on the educational program.
>
> *Resolved Further,* That the administration and the Executive Committee of the Corporation give these objectives serious consideration in the allocation of operating and capital funds.

With their characteristic and generous interest in student welfare, the Alumni have acted to make possible enlarged

student housing and recreational facilities. A gift of $500,000 from the M. I. T. Alumni Fund, to supplement the funds deemed by the Finance Committee to be a justifiable investment of endowment funds, permits us this autumn to begin construction of the new Senior House, which will provide accommodations for 353 students. New and hitherto unused areas of land west of Massachusetts Avenue have been leveled and seeded for athletic purposes, and with the assistance of the Alumni Fund eight new tennis courts have been completed.

The Need for Funds

The year also brought the opening of a sustained effort to increase the Institute's financial resources. The present capital needs of the Institute are estimated to be of the order of $20,800,000, and we are aggressively occupied at the present time in seeking funds, project by project, to finance these needs. Any effort of this sort must go through an initial phase devoted to informing potential donors fully about the needs of the institution, and we are at present in the middle of this problem of stating our case. The next phase will require more extensive organization involving both Corporation and Alumni.

The program has been set forth in a bulletin entitled "M. I. T. — A New Era," which has been widely distributed among Alumni and friends of the Institute and which summarizes the problem as follows:

"The most pressing needs of M. I. T. are chiefly for capital rather than for operating expenses. This is the reverse of most previous experience and especially of the experience in the state universities, where funds for buildings and facilities have been more generously available than funds for salaries and operations.

"M. I. T. needs both (especially does it need additional endowment income), but the immediate obstacles to its proper development are principally lack of laboratories and class-

rooms for educational purposes, of student housing, of facilities for student recreation and welfare, and of unrestricted funds. The operations of M. I. T. have increased out of all proportion to its plant and endowment. It is operating a [$17,000,000] program with a plant and endowment adequate for a $3,500,000 program.

"Its increased tuition rate (relieved by scholarship and loan funds) will help to meet increased operating expenses. Projects undertaken for industry and government pay their own operating expenses and at the same time provide for students and staff educational advantages otherwise unavailable. Through these several ways, operating income has increased substantially, but no funds are available from these sources to supply the plant additions required for a growing and broadening educational program. Every effort has been made internally, and with existing capital resources, to adjust operations to the Institute's needs and opportunities, but this alone is inadequate.

"If it is to turn out the well-rounded citizens and professional men which the country requires in this atomic era, if it is to continue its leadership as a great center for education and for the advancement of learning, M. I. T. must have the buildings and equipment required to do the job. In fact, *the need is so urgent as to justify the statement that the institution will decline in usefulness and leadership unless these requirements can be met.*

"M. I. T.'s position today is analogous to its position following World War I. At that time, with new opportunities opening up, it received a great lift from George Eastman's gift of $20,500,000. Today a comparable amount is needed if there is to be another surge forward in the Institute's logical development and in its contributions to society."

The following items represent some of the significant progress toward the realization of these capital needs.

The George Westinghouse Educational Foundation has established a George Westinghouse Professorship in Mechanical Engineering, which will be publicly announced shortly.

The very attractive plans for the Charles Hayden Memorial Library were found to require funds substantially beyond those available. The architects have restudied the problem and arrived at a new plan which, in its preliminary showing, seemed to all who saw it to be even better than the earlier design and probably capable of erection within our budget.

Construction is under way on the Navy-financed, M. I. T.-operated supersonic wind tunnel, located on the extreme western end of our property. This project, involving about $2,600,000, will make available to us a facility in this field unsurpassed by any other in the country.

Based upon a finding of need by the United States Office of Education that the facility is necessary to provide education and training to veterans, the Bureau of Community Facilities of the Federal Works Agency is making available to the Institute a large drill shed located at Camp Peary, Virginia, which the Navy has declared surplus. This building will be transported to Cambridge, where 33,000 square feet of it will be used to construct an athletic building 200 by 165 feet; the remaining 17,000 square feet will be available to a government research project which needs hangar facilities at the Bedford Airport. Through the acquisition of this large structure, the Institute will be able by spring to have an athletic cage which essentially fulfills specifications which had been set up for this part of our ultimate athletic development.

A number of gifts or pledges have been received toward the Hydrodynamics Laboratory and Naval Towing Tank, but substantial funds remain to be secured before this laboratory can be constructed.

In support of our program in Nuclear Science and Engineering, which at present is being financed largely through the

Office of Naval Research, one initial industrial contribution has been received and another large contribution has been pledged conditioned upon contributions from at least three similar corporations. Based upon negotiations to date, we feel exceedingly optimistic over the possibility of successfully arranging for this private support of our program during a period of several years.

I hope to be able to report additional gains in our program at a later date on the basis of negotiations and contacts now in progress.

Respectfully submitted,

KARL T. COMPTON
President

October 6, 1947

The following pages present statistical summaries of the past year's operations and a list of personnel changes.

STATISTICS OF THE YEAR

Finances. The Institute's endowment and other funds now have a total book value of $47,000,000, an increase of $1,000,000 over 1946. Plant assets stand at $18,368,000, slightly more than $1,000,000 above last year. The yield on investments based on market values increased somewhat over the previous year with the allocation to funds at the rate of 3.75 per cent.

The cumulative deficit for the Institute's entire history is $41,642. The year 1946–1947 ended with a deficiency of income of $4,784 on operations totaling over $17,000,000.

The volume of sponsored research decreased sharply as was anticipated, totaling $9,825,000, compared to over $24,000,000 in 1946. 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, 1946–1947

INCOME

	Per cent	
	1939–1940	1946–1947
Tuition	48	20
Investments	32	6
Gifts and Other Funds	7	12
Research Contracts:		
For Direct Expense	3	6
For Indirect Expense	0	49
Dormitories, Dining Services	10	7
	100	100

EXPENSE

	Per cent	
	1939–1940	1946–1947
Academic	61	27
General Administrative	13	7
Plant Operation	10	8
Research Contracts:		
Direct	3	49
Medical and Other	4	2
Dormitories, Dining Services	9	7
	100	100

The problem of establishing mutually satisfactory peacetime contractual and fiscal relationships has been a matter of concern to both the government and academic contractors. The more pressing of these problems concerned the policies and procedures best suited to assure fair and adequate reimbursement to the academic contractors for the indirect expenses incurred in carrying on sponsored research. Many of these problems have been resolved during the last year through recognition by the government authorities that a detailed cost analysis is impracticable using records designed for other pur-

poses. The War and Navy departments have agreed to treat the institution as an indivisible whole and to use salaries and wages as the primary index in computing reimbursement for indirect expenses. Experience during the year just ended has demonstrated the merits of the new procedures.

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

	Capital Additions	*Total Gifts*
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

Of the total gifts last year, $420,000 came as grants from industrial companies, $1,240,000 from foundations, and $720,000 from individuals.

Contributions to the Alumni Fund were the highest in its seven-year life, totaling $184,952 from 10,005 Alumni. This represented an increase in contributions of almost 12 per cent over 1946, the number of contributors remaining the same. The decision of the Class of 1896 to make its fiftieth anniversary contribution through the Alumni Fund was both significant and encouraging. The same action has been taken by the Class of 1897, which should add considerably to the total contributions for the current year.

Enrollment. The total student body reached an all-time high of 5,172 last year, compared with the official count of 1,538 on July 30, 1945. Registration this fall will rise to 5,600. Of the total last year, approximately 60 per cent were veterans, approximately 25 per cent were married. Seventy-five women students were enrolled. A total of 231 American colleges and universities and seventy-six foreign institutions were represented in the Institute student body. Students from forty-six foreign countries were enrolled.

Student Aid. The demands on the undergraduate scholarship funds and on the loan fund continued below normal, primarily because of the availability to veterans of scholarship aid from the Federal Government. Undergraduate scholarships totaled $55,742, almost $1,000 less than 1945–1946; loans to all students amounted to $28,977, an increase of $12,660 over the previous year but still far below the $163,000 loaned in 1939–1940. On the other hand, graduate scholarships and fellowships increased materially, totaling $128,519, compared to $82,412 a year ago. The increase was accounted for in large measure by the increase in the number of industrial fellowships. The Student Employment Bureau of the Technology Christian Association placed 386 students in part-time jobs and they earned a total of $70,674 compared with $47,277 earned by 275 students in 1945–1946.

Changes in Personnel. The Corporation ranks have been changed only by reason of term expirations during the past year. The Special Term Membership of Willard H. Dow terminated in January, and the five-year Alumni Terms of B. Edwin Hutchinson, Duncan R. Linsley, and Richard L. Bowditch expired in June. New Alumni Term Members are James McGowan, Jr., Harold Bugbee, and C. George Dandrow. As representatives of the Commonwealth of Massachusetts, Governor Robert F. Bradford succeeded Maurice J. Tobin, and the new Chief Justice of the Supreme Judicial Court, Stanley E. Qua, succeeded Fred T. Field. Raymond H. Blanchard succeeded Harold Bugbee as President of the Alumni Association. After leaves of absence necessitated by heavy war activities, Vannevar Bush and Alfred L. Loomis resumed active membership during the year.

Professor Kurt Lewin, a member of the Institute staff since 1944 and in charge of the Research Center for Group Dynamics, died suddenly on February 12, 1947, and Professor Clark S. Robinson, a member of the Institute staff since 1915,

died on May 23, 1947, after a long illness. Frederick R. Evans, Assistant Professor in the Department of Metallurgy, died on September 15, 1946.

Retirements on account of age removed many beloved and valuable members of the staff during the year, although a few will continue on a part-time basis during the next few years. The following were retired with the rank of Professor Emeritus: Professors Waldo V. Lyon, Henry B. Phillips, Henry L. Seaver, Lybrand P. Smith, and William H. Timbie; Associate Professors Arthur L. Goodrich and William H. Jones; and Assistant Professor Lyman M. Dawes. William N. Seaver, a member of the Institute staff since 1924, becomes Librarian Emeritus.

Resignations were accepted from the following: Professors Ralph D. Bennett, Captain William H. Buracker, and Captain Charles D. Wheelock; Associate Professors Wilmer L. Barrow, Bernhard Haurwitz, Lieutenant Colonel Thomas M. Larner, and Louis F. Woodruff; Assistant Professors Paul C. Eaton, Thomas R. P. Gibb, Jr., Willard F. Gray, William M. Hearon, Malcolm S. McIlroy, Daniel Rosenthal, Arthur C. Ruge, Marvin B. Sledd, Charles F. Squire, Edward R. Van Driest, and William M. Woodward.

Promotions to the rank of full Professor included the following: Herbert L. Beckwith, Samuel H. Caldwell, Ivan A. Getting, Albert G. Hill, James Holt, John R. Markham, Dean Peabody Jr., Ronald H. Robnett, John T. Rule, Paul A. Samuelson, Hsue-Shen Tsien, and Arthur R. von Hippel.

The following were promoted to the rank of Associate Professor: William H. Brown, Dorwin P. Cartwright, Karl W. Deutsch, Cecil G. Dunn, Herman Feshbach, Clark Goodman, Roland B. Greeley, Cecil E. Hall, John W. Irvine, Jr., Ronald Lippitt, Richard C. Lord, Jr., René Miller, John B. Rae, Ascher H. Shapiro, Herman J. Shea, Clark C. Stephenson, David F. Waugh, Walter L. Whitehead, and Jerome B. Wiesner.

Promotions to the rank of Assistant Professor included

the following: Benjamin L. Averbach, Alex Bavelas, John A. Beckett, Bernard Chertow, William Van A. Clark, Jr., Stephen H. Crandall, Marcy Eager, Robert M. Fano, Bernard T. Feld, Leon Festinger, Rogers B. Finch, David P. Herron, Myle J. Holley, Burnham Kelly, Jack B. Pohlenz, Fritjof A. Raven, John D. Roberts, Lloyd Rodwin, Keith E. Rumbel, Charles N. Satterfield, Rodney H. Smith, Ariel A. Thomas, and James N. Thurston.

New appointments included the following Professors: Admiral Edward L. Cochrane, Professor and Head of the Department of Naval Architecture and Marine Engineering, Commander Ernest C. Holtzworth and Captain Everett E. Mann in the same Department. Professor Edward L. Bowles has returned to the staff on a part-time basis as Consulting Professor in Electrical Communications.

New Associate Professors are Leo L. Beranek, Eugene W. Boehne, and Lan Jen Chu in Electrical Engineering; Chia-Chiao Lin in Mathematics; Victor P. Starr in Meteorology; Lieutenant Colonel Raymond S. Crossman, Major Hollis Dakin, Lieutenant Colonel Kenneth W. Holbert, and Major Jack F. Lane in Military Science and Tactics.

New Assistant Professors are as follows: Yee Jing Liu in Aeronautical Engineering; James S. Cross in Business and Engineering Administration; Lyle B. Borst and David N. Hume in Chemistry; E. Cary Brown in Economics and Social Science; Edmond P. Garvey, John F. Reintjes, and J. Earl Thomas, Jr., in Electrical Engineering; Duncan S. Ballantine, Klaus Liepmann, and Joseph N. Ulman, Jr., in English and History; Patrick M. Hurley in Geology; Warren Ambrose in Mathematics; Svante Mellgren, C. Arthur W. Peterson, Amos J. Shaler, and William T. Turrall in Metallurgy; Lieutenant Colonel Herrick F. Bearce, Major John C. Bolton, Captain Harold K. Graves, Captain Robert L. Rooker, Lieutenant Frank H. Senn, Captain Jack W. Streeton, and Lieutenant

Colonel Curtis L. Varner in Military Science and Tactics; and John H. Evans in Naval Architecture and Marine Engineering.

There were several administrative changes and adjustments during the year, among which the most important are listed here. Jerome C. Hunsaker, long Head of both the Departments of Aeronautical and Mechanical Engineering, requested assignment to the Department of Aeronautical Engineering only. This change was made effective as of July 1 of this year, and Professor C. Richard Soderberg was appointed Head of the Department of Mechanical Engineering. Professor William T. Martin was appointed Head of the Department of Mathematics; Professor Edward S. Taylor was made Director of the Gas Turbine Laboratory; and Professor Edwin R. Gilliland accepted the Associate Directorship of the Laboratory for Nuclear Science and Engineering. The School of Architecture and Planning was divided administratively into the Department of Architecture and the Department of City and Regional Planning, and Professors Lawrence B. Anderson and Frederick J. Adams were appointed Heads, respectively, of the two Departments under William W. Wurster as Dean of the School.

Everett Moore Baker was appointed Dean of Students, and Ivan J. Geiger was appointed Director of Athletics. Harold E. Lobdell, former Dean of Students, was appointed Executive Vice President of the Alumni Association, and Thomas P. Pitré was appointed Dean of Freshmen. Vernon D. Tate accepted the post of Librarian to succeed William N. Seaver, retired; and Robert E. Booth has recently been appointed Associate Librarian. R. Colin Maclaurin was appointed Personnel Officer.

ADMINISTRATIVE OFFICERS

Dean of Students

On January 1, 1947, Harold E. Lobdell, who had served as dean of students for over seventeen years, became executive vice president of the Alumni Association, and Everett Moore Baker was appointed to succeed him as dean. Thomas P. Pitré, formerly Associate Dean of Students, was at the same time appointed dean of freshmen. In February, James L. Phillips of the Class of 1947 was appointed assistant to the Dean of Students. The offices of the Dean of Students were moved from Building 3 to more adequate space in Building 7.

The organization of the Dean's Office remained practically unchanged, with three exceptions: Mr. Lobdell, as executive vice president of the Alumni Association, continued as chairman of the Technology Loan Fund Board. Mr. Pitré was appointed chairman of the Undergraduate Scholarships Committee. The Registrar and Director of Admissions, who formerly reported to the Dean of Students, hereafter report directly to the President. The joint activities of the offices of Dean of Students, Director of Admissions, and Registrar are coordinated under the new organization by a committee composed of the Registrar, the Director of Admissions, the Dean of Freshmen, and the Dean of Students who serves as chairman.

The new Dean of Students wishes to record here in his first annual report his sincere and hearty appreciation and gratitude for the thorough cooperation and unsparing help he has received from his predecessor and all his new colleagues.

Veteran Enrollment

As was anticipated, the number of students receiving benefits under Public Laws 16 and 346 expanded greatly, 3,048 being registered during the fall term and 3,146 during the spring term. The comparative increase is illustrated in the following tabulation:

Tabulation 1	*Veterans Enrolled under P.L. 16 or 346 and Their Percentage of Total Registration*	
	1945–1946	*1946–1947*
Fall Term	472 (19.4%)	3,048 (59%)
Spring Term	1,194 (41.3%)	3,146 (60%)
Summer Term	1,305 (55%)	1,587 (60%)

Student Life and Activities

It is noteworthy that during the calendar year 1946, more than 2,200 former Technology students returned after their discharge from service. In the fall term, approximately 1,200 came back to their interrupted education. Although it was possible to bring the academic calendar to its prewar status, the accelerated schedule of offering eight terms' work simultaneously was continued to accommodate the increased number of veterans.

The inroads made on the student body during the war caused many rapid changes in student personnel, which affected in part the operation of our undergraduate activity system. With the opening of the fall term in 1946 the task of bringing the student organizations back to a proper level of efficiency and activity posed a serious problem for those men who were responsible for their operation. In several instances men in key posts were either returning to their work after a lapse of some time, or were limited in the experience necessary to enable them to grapple with the responsibilities of student government or other student organizations. With the help of the Corporation Committee on Student Activity, student leaders acquired a definite grasp of the situation and after a few weeks of uncertainty all the major activities were functioning with more assurance. By the end of the college year the student activity system had made great strides towards its objective and with a student body approaching more nearly "normal" conditions, even though the numbers have been greatly increased, it is anticipated that the coming year will find undergraduate organizations in a position to carry on with confidence.

Student Organizations. The Institute student body has always had a strong reputation for responsible self-government. The year marked a notable resumption by all student organizations of a high degree of responsibility for their own activities under capable leadership — a definite improvement in the total educational purpose of the Institute.

All undergraduate publications, some of whose schedules had been irregular during the war period, returned to regular issue dates and their boards resumed normal continuity. Practically all the recognized sixty-five student Class A and Class B

organizations returned to regular activities and strengthened their programs. Two new organizations were established: the M. I. T. Veterans Association and the Liberal Arts Society. The Institute Committee appointed a special committee of students to participate in the preliminary discussions of the organization of the National Student Association. With the encouragement of the Corporation Committee on Student Activity, faculty assistance, and high quality of student leadership, the Tech Show was again successfully presented, after a lapse of ten years.

Housing. With the greatly increased enrollment during the academic year 1946–1947, the housing problem was extremely difficult. The opening of Westgate and Westgate West for married veterans eased the situation, but the demand for living accommodations for all students, single and married, and for junior staff members and faculty personnel remained far in excess of available facilities.

During the year, students were housed as follows:

Tabulation 2	*Number*	*Per Cent*
Dormitories	715	13.6
Barracks	500	9.5
Graduate House	452	8.6
Student houses	74	1.4
Westgate and Westgate West	270	5.1
Fraternity houses	656	12.5
Rooming houses or at home	2,583	49.3

Plans for the new Senior House, to accommodate approximately 350 students on Memorial Drive west of Massachusetts Avenue, were drawn during the year. If this building can be completed by September, 1948, a long step will have been taken toward the goal of more adequate housing for the undergraduate body. Although classrooms in the main buildings have been made available for study for students living in the Barracks to supplement their crowded study cubicles, this temporary housing, while inexpensive, is not desirable.

The Westgate veteran community has proved thoroughly satisfactory. The government-financed section, Westgate

West, was completed in midwinter and the grading and landscaping in late spring. The morale of the community and the degree of citizen responsibility for the welfare of all residents have been extremely high.

The Housing Bureau continued to assist members of the staff and married students to secure living quarters. All applications for residence in Westgate and Westgate West are handled by the bureau. During the past twelve months, 893 individuals registered for housing through the bureau, 400 were placed in permanent private apartments, and temporary accommodations were secured for a large percentage of the balance.

Fraternities. With the return of many veterans to the Institute and the sudden increase in enrollment, there was considerable confusion within the fraternities. Some houses had suspended their regular activities during the war and required complete reorganization after the return of their active members. Under the able leadership of the officers of the Inter-Fraternity Conference, five special working subcommittees were instituted to plan improvements in the operations of fraternity activities. These were: committee for redrafting the constitution, committee on social responsibility, committee on cooperative buying, committee on rushing policy, and committee on extracurricular activities. These committees did much to stimulate the reactivation of fraternities and immediately improve the general morale.

Late in the spring informal discussions were begun with representatives of most of the fraternities located in Boston and Brookline to ascertain the degree of interest in the eventual possibility of "a fraternity quadrangle" on Institute land now occupied by Westgate West. The fraternity representatives, both student and alumni, registered favorable interest in the possibility.

Athletics. During the fall term the Institute Committee appointed a special committee of students to survey and make recommendations concerning the athletic program. This committee finally reported in February of the spring term. It made two major recommendations: that the Institute should employ a full-time director of athletics and that some form of required athletics for freshmen be reinstituted.

Prior to the presentation of this report to the President, he, the Vice President, and the Dean of Students had anticipated the suggestion of a director of athletics, and the Dean of Students had been requested to begin a survey of possible candidates for the position. Many of the outstanding men in physical education were consulted and a large number of candidates were interviewed. The special committee charged with this responsibility, composed of Dr. Dana L. Farnsworth, the Medical Director, Ralph T. Jope, Secretary of the Advisory Council on Athletics, and the Dean of Students, unanimously recommended Ivan J. Geiger, executive director of physical education and intramural athletics at the United States Coast Guard Academy. Mr. Geiger was appointed director of athletics on June 1, 1947. A man of great initiative, imagination, and enthusiasm, he began at once to plan for and develop a more adequate athletic and physical education program, including an increase in intramural athletics and specific recommendations for required athletics for freshmen. All concerned with this phase of undergraduate life agree that Mr. Geiger will do much to solve many of the problems inherent in a system of athletics which has lacked continuity and over-all supervision.

During the spring, eight new tennis courts were constructed on the southwest area of the playing fields and plans were made for the grading and resurfacing of a large portion of the land west of Massachusetts Avenue, thereby more than doubling the area available for athletics.

Musical Clubs. At the end of the fall term the Musical Clubs lost the student director of the newly organized Symphony Orchestra. In a relatively short period the orchestra had proved its worth as an active part of the musical interest of the Institute community, not only for students but also for staff members. In consultation with the Dean of Students, the orchestra officers engaged Klaus Liepmann as a part-time director for the spring term. Under his enthusiastic and able leadership the orchestra developed new spirit and competence. Late in the spring term Mr. Liepmann was appointed a member of the Faculty in the Division of Humanities, to have charge of all extracurricular musical activities and interests of the Institute community. In his capacity as a teacher in an

established subject, Mr. Liepmann will be responsible to the Division of Humanities. As the organizer, promoter, and director of extracurricular musical affairs, he will be responsible to the Dean of Students.

Hobby Shop. The Hobby Shop continued to be a very popular undergraduate activity. The average daily attendance was nineteen, and a total of 916 different students worked in the shop. The responsibility for the Hobby Shop was transferred from the Director of Libraries to the Dean of Students.

Freshman Camp. For the first time in several years, Freshman Camp was held the week end before the opening of the fall term, September 30, 1946. A more suitable location was found at Sharon, where the equipment and facilities proved to be more satisfactory than at Camp Massapoag, the site of Freshman Camps for more than a decade. With the large number of matriculants in the Class of 1950, some 300 were required to postpone their entrance until February, 1947. To acquaint this second group of freshmen with the general scheme of undergraduate activities, the Technology Christian Association conducted another camp on February 10, at the Institute.

Student Aid

Distribution of student aid to undergraduates during 1946–1947 compared with 1945–1946 is set forth in Tabulation 3.

Tabulation 3	*1946–1947*		*1945–1946*	
	Number	*Award*	*Number*	*Award*
Freshman Scholarships	137	$30,850	223	$37,231.25
Other Undergraduate Scholarships	180	24,892	166	19,250.25
Total Scholarships	317	$55,742	389	$56,481.50
Undergraduate Loans	47	20,702	34	13,267.00
Total Aid to Undergraduates	338*	$76,444	359*	$69,748.50

* Allowing for individuals receiving both scholarship and loan.

The above tabulation includes only grants from our regular scholarship endowment. However, other agencies have con-

tributed: The James Melvin Trust granted aid to seven undergraduates totaling $1,570, and the Teagle Foundation, Inc., of New York granted aid to six students totaling $3,800.

From both graduate and undergraduate students, the Loan Fund Board received seventy-six applications during 1946–1947 and acted favorably upon sixty-eight, or 89 per cent, $28,977 being loaned. For 1945–1946 the corresponding figures were: forty-nine, forty-five, 92 per cent, and $16,317. Repayments to the Fund during 1946–1947 were $83,040 on principal account and $8,239 for interest, or a total of $91,279. Thus for the sixth year in the history of the Fund, repayments on principal account exceeded the total of loans made, the excess being $54,063.

Cumulative Record of the Technology Loan Fund

Tabulation 4	*At June 30, 1947*	*At June 29, 1946*	*Net Changes During 1946–1947*	
Items of Outgo				
Number of Men Receiving Loans....	2,694	2,626	up	68
Total Amount Loaned.....	$1,931,810	$1,902,833	up	$28,977
Average Per Capita Loan.....	$717	$724	down	$7
Items of Income				
Number of Men Whose Indebtedness Has Been Completely Discharged.....	1,978	1,850	up	128
Principal Repayments in *Advance*....	$551,746	$521,636	up	$30,110
Other Principal Repayments.....	$1,005,951	$953,021	up	$52,930
Total Principal Repayments.....	$1,557,697	$1,474,657	up	$83,040
Total Principal Matured, Considering "Advance Repayments" as Matured When Paid.....	$1,591,406	$1,510,521	up	$80,885
Collection Ratio, i.e., Percentage of Total Maturities Paid.....	97.9	97.7	up	0.2
Matured Principal in Arrears.....	$27,979	$30,252	down	$2,273
Actual "Written Off" Accounts.....	$5,729	$5,611	up	$118
Total Maturities Unpaid.....	$ 33,708	$35,863	down	$2,155
Interest Received.....	$212,174	$203,935	up	$8,239
Notes Outstanding.....	$368,383	$422,564	down	$54,181

The cumulative record of the Fund from its establishment in 1930 up to June 30, 1947, appears in Tabulation 4 above.

It is notable that the $212,174 received for interest up to the end of 1946–1947 was over six times the amount of matured principal then unpaid, $33,708.

The Student Employment Bureau of the Technology Christian Association placed a total of 386 individuals, who earned $70,674; the year previous 275 individuals were placed, who earned $47,277.

EVERETT MOORE BAKER

DEAN OF THE GRADUATE SCHOOL

How large should the Graduate School be at M. I. T.? This is a question posed by the current rate of increase in numbers. As of November, 1946, there were registered 1,361 graduate students, many of whom were also filling subfaculty academic appointments and some of whom were enrolled for one subject per term only.

The increase in undergraduate enrollment to more than 3,800 has had one unforeseen effect on the Graduate School. It has increased the need for assistants to help professors with laboratory preparation and correcting of papers. For such posts, the most able assistants are those who will accept appointment only if they at the same time have a chance for some graduate study.

During the year a study was made of the participation by certain graduate students in research supported by governmental funds through contracts with M. I. T., to determine if such research might be so closely directed and supervised as to diminish its educational value for a student participant. The preliminary conclusion of the Committee on the Graduate School is that nothing in contract research, per se, lessens its educational value; that such research may appropriately be the basis of a graduate student's thesis, when properly chosen and conducted; that in fact there are often positive advantages to the student who conducts thesis research as a part of a well-organized and well-equipped project.

As to certain nonprofessional aspects of graduate student education, there have been established through the cooperation of administrative officers, department heads, and instructors a

series of seminars in the humanities which have certain aspects new to most American colleges. Six are now being offered, to graduate students only, in groups not exceeding twenty men. Given by leaders in their fields, the seminars serve as introductions to learning in nonprofessional areas of knowledge and are without grades other than "Satisfactory." Topics include psychology, philosophy, current economic problems, international relations, economic and industrial history, and reading of famous books. Graduate students with deficiencies in humanities have first priority, and other graduate students may enter any unfilled sections.

As a gesture of friendliness, two-score members of the instructing staff have each volunteered to meet with a group of not over twelve graduate students, after hours, about once a week for ten weeks in the fall term to demonstrate and mutually explore some avocational interest, not the professional specialty of the group leader. These have been named "avocation seminars." No registration and no credit are involved.

Fellowship aid for graduate students continues to be provided generously by industry. On April 1, 1947, there were available for graduate students fifty fellowships paying $82,500 funded by industrial sponsors, and Institute funds for graduate student scholarship aid in the sum of $48,500. During the twelve months preceding July 1, 1947, scholarship assistance in the sum of $128,519.50 was awarded to 330 recipients.

In the same period, there were conferred 528 advanced degrees, as follows: Doctor of Philosophy, 26; Doctor of Science, 40; Master of Science, 431; Master in Architecture, 14; and Master in City Planning, 17.

JOHN W. M. BUNKER

REGISTRAR

Many new records in the history of the Institute were made in 1946–1947. The changed conditions are best illustrated by a comparison with the last prewar year, 1939–1940. The total registration of 5,172 was 2,072 more than the 3,100 in 1939–1940 — an increase of 67 per cent. Sixty per cent of the students were veterans and about 25 per cent were married. These two factors, together with the competition to obtain and

to hold a place in college, produced a serious and studious attitude which resulted in the highest standard of scholarship in the history of the Institute.

The percentage increases in the three schools were: Architecture, 44 per cent; Engineering, 69 per cent; and Science, 65 per cent. Electrical Engineering was the largest course, with 1,091 students. Four Courses — Building Engineering and Construction, Electrical Engineering, Mathematics, and Physics—increased by more than 150 per cent over 1939–1940. Only two Courses — Geology and Naval Architecture — decreased. The decrease in Naval Architecture was expected in view of the reduced shipbuilding program since the war.

The undergraduate student body increased 1,432, or 60 per cent, from 2,379 in 1939–1940 to 3,811, of which 1,054 were former students returning last fall. The number of undergraduates was 306 larger than the previous high in *total* enrollment of 3,505 in 1921. The five major Courses still continued the most popular, with registrations as follows: Mechanical Engineering, 602; Electrical Engineering, 877; Chemical Engineering, 526; Business and Engineering Administration, 458; and Aeronautical Engineering, 315, a total of 73 per cent of the undergraduates.

The graduate enrollment of 1,361 was 640 larger than in 1939–1940, or 89 per cent. A much larger proportion than usual of the graduates were part-time students and also members of the staff, as many departments were unable to secure competent young men for teaching the large number of undergraduates and for research work except by also offering them the opportunity for graduate study.

The changes in the principal grades of the staff compared with 1939–1940 are shown in the following table:

	1939–1940	*1946–1947*	*Increase*
Professors	98	110	12
Associate Professors	89	128	39
Assistant Professors	83	125	42
Instructors	102	134	32
Teaching Fellows	52	74	22
Assistants	78	127	49
Subtotal	502	698	196
Research Associates	38	153	115
Research Assistants	90	193	103
Grand Total	630	1,044	414

As would be expected, the number of degrees awarded is exceeding previous highs. In the last twelve months, the number of Bachelor's degrees awarded was 818, compared to a previous high of 637 (in 1922); the number of Master's degrees was 462, compared to 295 (in 1940); and the number of Doctor's degrees was 66, which did not equal the previous high of 71 (in 1939). With the present large enrollment (e.g., the sophomore class in September, 1947, is expected to reach 1,075), the number of degrees granted in a year has not reached its peak.

The Institute has grown suddenly without any confusion or large classes poorly taught. This accomplishment is a credit to the careful estimating, thoughtful planning, and persistent effort under trying conditions since 1944 by the administration, instructing staff, and nonstaff personnel of the Institute. The registration officers in particular have devoted a great deal of time and effort to the individual problems of each returning veteran and deserve a large share of credit for the smooth transition to the new postwar conditions.

The statistics for the year 1946–1947 and summary statistics for preceding years follow (pages 41–58).

JOSEPH C. MACKINNON

STATISTICS ON REGISTRATION AND DEGREES

Report of the Registrar for the Year 1946–1947

All statistics on registration and staff for this year are as of November 1, 1946.

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		
1892–93	1,060	1920–21	3,436		

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

TABLE 2. The Corps of Instructors

	'34	'35	'36	'37	'38	'39	'40	'41	'42	'43	'44	'45	'46
Faculty Members of the Staff	245	245	244	267	273	282	285	292	313	319	317	330	379
Professors	83	87	78	87	90	98	99	95	97	97	107	113	110
Associate Professors	69	81	87	89	98	89	92	99	104	108	105	103	128
Assistant Professors	82	68	70	76	72	83	83	86	98	99	92	101	125
Ex-Officio	6	6	6	5	6	7	7	7	8	9	10	10	11
Instructors	5	3	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
Other Members of the Staff	272	284	291	331	368	401	396	395	370	306	222	252	694
Instructors	86	90	97	101	97	99	91	101	100	97	70	82	119
Technical Instructors	—	—	—	—	—	—	—	6	7	8	6	8	14
Administrative Assistant	—	—	—	—	—	—	—	—	—	—	—	—	1
Teaching Assistants	—	—	—	—	—	—	—	—	—	1	—	—	—
Teaching Fellows	20	24	51	52	52	52	55	52	60	52	8	18	74
Fellows in Applied Math	—	—	—	—	—	—	—	—	—	—	—	—	4
Assistants	70	76	64	69	79	78	85	87	75	49	44	47	127
Technical Assistants	28	—	—	—	—	—	—	—	—	—	—	—	—
Lecturers	25	24	19	29	28	31	31	17	18	16	7	7	11
Research Consultant	—	—	—	—	—	—	—	—	—	1	—	—	—
Research Associates	22	27	31	22	25	36	35	47	34	23	33	39	151
Research Assistants	18	30	24	42	72	90	91	84	64	59	54	51	193
Research Fellows (D. I. C.)	2	1	—	—	—	—	—	—	—	—	—	—	—
Research Fellows	1	12	5	16	15	15	8	—	—	—	—	—	—
National Research Council Fellows	—	—	—	—	—	—	—	1	—	—	—	—	—
Staff Members (D. I. C.)	—	—	—	—	—	—	—	—	12	—	—	—	—
Total	517	529	535	598	641	683	681	687	683	625	539	582	1073
Other Members of the Faculty	26	27	31	28	28	28	32	37	40	39	44	52	60
Professors: Emeriti	23	24	29	27	27	27	31	36	39	38	43	51	59
Non-Resident	3	3	2	1	1	1	1	1	1	1	1	1	1

TABLE 3. Classification of Students by Courses and Years

COURSE NAME AND NUMBER	1944–45 YEAR						1945–46 YEAR						1946–47 YEAR					
	1	2	3	4	G	Total	1	2	3	4	G	Total	1	2	3	4	G	Total
Aeronautical Engineering XVI	65	10	21	12	28	136	103	21	6	47	31	208	104	83	74	54	110	425
Architecture IV, IV-B	5	3	2	5	10	25	12	5	—	6	12	35	34	34	22	17	41	148
Architecture (IV) Fifth Year	—	—	—	5	—	5	—	—	—	5	—	5	—	—	—	8	—	8
Biology																		
Quantitative VII	1	2	—	1	7	11	11	4	—	—	6	21	11	11	10	5	24	61
Physical VII-A	2	—	—	—	—	2	—	—	—	—	—	—	—	—	—	3	2	5
Building Engineering and Construction XVII	4	4	1	2	—	11	7	5	2	1	—	15	15	15	24	9	7	70
Business and Engineering Administration XV	30	7	12	8	4	61	38	17	8	6	4	73	64	160	104	130	32	490
Chemical Engineering X	79	9	35	21	41	185	132	28	3	25	32	220	140	158	123	105	137	663
Chemical Engineering Prac. X-A, X-B, X-C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	32	32
Chemistry V	22	10	6	5	34	77	44	6	3	10	45	108	40	39	30	22	141	272
Civil Engineering I	19	9	8	4	22	62	17	7	4	8	27	63	42	36	32	37	62	209
Economics and Engineering XIV	—	—	—	—	—	—	—	—	—	—	—	—	1	2	1	—	—	4
Electrical Engineering VI	80	16	21	7	60	184	158	38	11	13	51	271	222	242	192	139	201	996
Electrical Engineering (Coöperative) VI-A	—	—	18	14	2	34	—	—	2	24	6	32	—	—	55	27	13	95
Food Technology XX**	—	—	—	—	—	—	—	—	1	—	3	4	1	5	6	7	10	29
General Engineering IX-B	3	2	5	—	—	10	8	—	2	2	—	12	—	—	10	22	—	32
General Science IX-A	—	—	1	—	—	1	1	—	1	1	—	3	—	—	2	1	—	3
Geology XII	—	—	—	—	3	3	2	—	—	—	2	4	4	5	1	—	17	27
Group Psychology	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	13
Industrial Economics	—	—	—	—	5	5	—	—	—	—	4	4	—	—	—	—	16	16
Marine Transportation XIII-C	—	—	—	—	—	—	—	—	—	—	—	—	2	—	8	3	—	13
Marine Transportation (XIII-C) Fifth Year	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	4
Mathematics XVIII	5	2	1	2	10	20	10	10	4	—	12	36	5	9	15	7	69	105
Mechanical Engineering II	49	9	32	12	35	137	97	23	10	16	30	176	110	177	160	155	109	711
Torpedo Engineering (in Mech. Eng. Dept.)	—	—	—	—	2	2	—	—	—	—	2	2	—	—	—	—	7	7
Metallurgy III	4	1	4	2	24	35	6	2	2	3	18	31	12	14	18	19	62	125
Ceramics (in Metallurgy Department)	—	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	10	10
Meteorology XIX†	1	—	—	3	11	15	2	—	3	—	7	12	1	2	4	10	29	46
Naval Architecture and Marine Eng. XIII	16	3	2	4	—	25	14	6	2	4	—	26	18	13	5	23	9	68
Naval Construction and Engineering XIII-A	—	—	51	—	24	75	—	—	—	28	53	81	—	—	—	50	28	78
Physics VIII	22	6	11	11	23	73	41	10	4	8	30	93	81	58	54	34	166	393
Sanitary Engineering XI	—	—	—	—	3	3	—	—	—	—	3	3	—	—	—	—	14	14
Total	407	93	231	118*	349	1,198	703	182	68	207*	378	1,538	907	1,063	950	891*	1,361	5,172

* These totals include fifth year in Architecture IV and Marine Transportation XIII-C.
** Prior to September 1946 considered Course VII-B.
† Prior to September 1946 considered Course XIV.

TABLE 4-A Classification of Students by Courses, Options and Years

No.	Name	Option	Opt.	1 Opt.	1 Tot.	2 Opt.	2 Tot.	3 Opt.	3 Tot.	4 Opt.	4 Tot.	G Opt.	G Tot.	Total	Course Number
I	Civil Engineering			—	42	—	36	—	32	—	37	—	48	195	I
	Army Engineer			—	—	—	—	—	—	—	—	—	14	14	
II	Mechanical Engineering														
		1. General Mechanical Eng.	1	—		—		—		110					
		2. Engineering Science	2	—		—		—		3		111			
		3. Automotive Engineering	3	—	110	—	177	—	160	22	155		116	718	II
	Textile Technology			—		—		—		—		5			
	Army Ordnance			—		—		—		20		—			
III	Metallurgy														
		1. Metallurgy	1	—	12	—	14	—	18	16	19	56	72	135	III
		2. Mineral Dressing	2	—		—		—		3		6			
	Ceramics			—		—		—		—		10			
IV	Architecture			—	33	—	30	—	21	—	16	—	22	130	IV
	Fifth Year			—	—	—	—	—	—	—	8	—	—		
IV-B	City Planning			—	1	—	4	—	1	—	1	—	19	26	IV-B
V	Chemistry			—	40	—	39	—	30	—	22	—	141	272	V
VI	Electrical Engineering														
		1. Electric Power	1	—				22		16					
		3. Electrical Communications	3	—	222	205	242	59	192	67	139	—	201	996	VI
		4. Electronic Applications	4	—				58		29					
		5. Radar (Navy)	5	—		37		53		27					
VI-A	Electrical Engineering — Coöperative			—	—	—	—	—	55	—	27	—	13	95	VI-A
VII	Quantitative Biology			—	11	—	11	—	10	—	5	—	24	61	VII
VII-A	Physical Biology			—	—	—	—	—	—	—	3	—	2	5	VII-A
VIII	Physics			—	81	—	58	—	54	—	34	—	166	393	VIII
IX A	General Science			—	—	—	—	—	2	—	1	—	—	3	IX-A
IX-B	General Engineering			—	—	—	—	—	10	—	22	—	—	32	IX-B
X	Chemical Engineering			—	140	—	158	—	123	—	105	—	137	663	X
X-A	Chemical Engineering Practice — Graduate			—	—	—	—	—	—	—	—	—	32	32	X-A
XI	Sanitary Engineering			—	—	—	—	—	—	—	—	—	14	14	XI
XII	Geology			—	4	—	5	—	1	—	—	—	17	27	XII
XIII	Naval Architecture and Marine Engineering			—	18	—	13	—	5	—	23	—	9	68	XIII
XIII-A	Naval Construction and Engineering			—	—	—	—	—	—	—	50	—	28	78	XIII-A
XIII-C	Marine Transportation			—	2	—	—	—	8	—	3	—	—	17	XIII-C
	Fifth Year			—	—	—	—	—	—	—	4	—	—		
XIV	Economics and Engineering			—	1	—	2	—	1	—	—	—	—	4	XIV
XV	Business and Engineering Administration														
		A. Physical Sciences		52	64	134	160	91	104	112	130	—	32	490	XV
		B. Chemical Sciences		12		26		13		18					
XVI	Aeronautical Engineering			—	104	—	83	—	74	—	54	—	110	425	XVI
XVII	Building Engineering and Construction			—	15	—	15	—	24	—	9	—	7	70	XVII
XVIII	Mathematics			—	5	—	9	—	15	—	7	—	69	105	XVIII
XIX	Meteorology			—	1	—	2	—	4	—	10	—	29	46	XIX
XX	Food Technology			—	1	—	5	—	6	—	7	—	10	29	XX
	Industrial Economics			—	—	—	—	—	—	—	—	—	16	16	Ind. Econ.
	Group Psychology			—	—	—	—	—	—	—	—	—	13	13	Group Psych.
	Total				907		1,063		950		891*		1,361	5,172	Total

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

TABLE 4-B

Classification of Special Students by Courses and Years

(Included in Table 4-A)

	COURSE	YEAR					TOTAL	COURSE
		1	2	3	4	G		
I	Civil Engineering	—	—	—	—	3	3	I
II	Mechanical Engineering	—	1	—	6	11	18	II
III	Metallurgy	—	—	1	—	5	6	III
IV	Architecture	—	1	2	3	1	7	IV
	Fifth Year	—	—	—	1	—	1	IV (Fifth Year)
V	Chemistry	1	—	2	2	7	12	V
VI	Electrical Engineering	—	4	3	6	42	55	VI
VII	Quantitative Biology	—	—	—	1	4	5	VII
VIII	Physics	—	—	1	—	17	18	VIII
X	Chemical Engineering	—	—	—	1	11	12	X
XII	Geology	—	—	—	—	1	1	XII
XIII	Naval Architecture and Marine Engineering	—	—	—	—	1	1	XIII
XIII-C	Marine Transportation	—	—	1	1	—	2	XIII-C
XV	Business and Engineering Administration	—	—	—	2	1	3	XV
XVI	Aeronautical Engineering	—	—	—	—	6	6	XVI
XVII	Building Engineering and Construction	—	—	1	—	1	2	XVII
XVIII	Mathematics	—	—	1	1	17	19	XVIII
XX	Food Technology	—	—	2	—	—	2	XX
	Industrial Economics	—	—	—	—	2	2	Ind. Econ.
Total		1	6	14	24	130	175	Total

TABLE 4-C

Classification of Former Students Who Returned This Year*

(Included in Table 4-A)

	COURSE	YEAR					TOTAL	COURSE
		1	2	3	4	G		
I	Civil Engineering	4	14	13	10	4	45	I
II	Mechanical Engineering	29	44	54	57	16	200	II
	Textile Technology	—	—	—	—	2	2	
III	Metallurgy	5	2	5	8	7	27	III
IV	Architecture	3	7	2	5	4	21	IV
	Fifth Year	—	—	—	1	—	1	IV (Fifth Year)
IV-B	City Planning	1	1	—	—	—	2	IV-B
V	Chemistry	3	7	11	4	4	29	V
VI	Electrical Engineering	40	71	71	47	17	246	VI
VI_5	Radar (Navy)	—	—	1	—	—	1	VI_5
VII	Quantitative Biology	4	4	1	2	3	14	VII
VII-A	Physical Biology	—	—	—	—	1	1	VII-A
VIII	Physics	18	15	17	9	14	73	VIII
IX-A	General Science	—	—	1	1	—	2	IX-A
IX-B	General Engineering	—	—	5	8	—	13	IX-B
X	Chemical Engineering	21	52	48	27	20	168	X
XI	Sanitary Engineering	—	—	—	—	1	1	XI
XII	Geology	2	1	—	—	5	8	XII
XIII	Naval Architecture and Marine Engineering	8	6	—	9	3	26	XIII
XIII-A	Naval Construction and Engineering	—	—	—	—	1	1	XIII-A
XIII-C	Marine Transportation	1	—	—	5	—	6	XIII-C
XIV	Economics and Engineering	—	—	1	—	—	1	XIV
XV	Business and Engineering Administration	23	60	27	44	—	154	XV
XVI	Aeronautical Engineering	17	22	28	20	22	109	XVI
XVII	Building Engineering and Construction	2	4	5	—	—	11	XVII
XVIII	Mathematics	—	3	3	—	8	14	XVIII
XIX	Meteorology	—	1	3	3	7	14	XIX
XX	Food Technology	—	1	1	1	1	4	XX
	Industrial Economics	—	—	—	—	1	1	Ind. Econ.
	Group Psychology	—	—	—	—	1	1	Gr. Psych.
Total		181	315	297	261	142	1196	Total

*Excludes 46 special students.

TABLE 5. Classification of Students by Courses since 1939

	1939–40	1940–41	1941–42	1942–43	1943–44	1944–45	1945–46	1946–47
Engineering Courses . . . . . *Total*	2,418	1,922	1,836	1,861	1,276	976	1,225	4,092
Aeronautical Engineering XVI	245	237	147	169	199	136	208	425
Building Engineering and Construction XVII. . .	26	17	14	16	9	11	15	70
Business and Engineering Administration XV . . .	251	223	205	177	68	61	73	490
Chemical Engineering X, X-A, X-B, X-C	497	338	348	360	278	185	220	695
Civil Engineering I	117	80	71	72	72	62	63	209
‡Economics and Engineering XIV	—	—	—	—	—	—	—	4
Electrical Engineering VI, VI-A	432	325	256	287	237	218	303	1,091
‡Electrochemical Engineering XIV	2	—	—	—	—	—	—	—
General Engineering IX-B	68	42	36	38	20	10	12	32
Mechanical Engineering II, II-A	455	357	345	330	200	139	178	718
*Metallurgy III	124	129	125	88	40	36	31	135
‡Meteorology XIX	—	—	110	141	19	15	12	46
*Mining Engineering III	10	—	—	—	—	—	—	—
Naval Architecture and Marine Eng. XIII, XIII-C	139	121	125	115	52	25	26	85
NavalConstruction and Engineering XIII-A	42	49	46	62	79	75	81	78
Sanitary Engineering XI	10	4	8	6	3	3	3	14
Science Courses . . . . . *Total*	543	453	427	341	265	187	269	895
§Biology and Public Health VII, VII-A, VII-B, VII-T	91	82	81	79	42	13	21	66
**Food Technology XX	—	—	—	—	—	—	4	29
Chemistry V	194	162	151	112	95	77	108	272
General Science IX-A	30	22	21	12	3	1	3	3
Geology XII	36	34	27	13	6	3	4	27
Mathematics XVIII	40	30	27	22	19	20	36	105
Physics VIII	152	123	120	103	100	73	93	393
Architecture IV, IV-B, IV-C . . . . . *Total*	108	112	92	77	30	30	40	156
Economics and Eng., Industrial Economics, and Group Psychology . . . . . *Total*	1	3	13	15	8	5	4	29
Unclassified . . . . . *Total*	30	64	60	39	—	—	—	—
†*First Year (not including Course IV)* . . . . . *Total*	—	584	627	715	—	—	—	—
Grand Total	3,100	3,138	3,055	3,048	1,579	1,198	1,538	5,172

* June 1940, Mining Engineering discontinued. Metallurgy, formerly Course XIX, changed to Course III.
† From September 1940 to November 1942, First Year Students not required to designate choice of course except for Course IV.
‡ June 1940, Electrochemical Engineering discontinued. June 1941, Meteorology, formerly included in Aeronautical Engineering, changed to Course XIV. September 1946, Meteorology changed to Course XIX. Course XIV Economics and Engineering 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 1942

UNITED STATES	1942	1943	1944	1945	1946
North Atlantic . . . . . Total	2,068	1,002	694	951	3,441
Connecticut	142	61	48	53	194
Maine	30	12	6	8	36
Massachusetts	906	445	319	450	1,569
New Hampshire	32	12	10	8	43
New Jersey	168	73	47	72	300
New York	566	303	198	276	936
Pennsylvania	170	76	46	62	300
Rhode Island	41	12	16	21	46
Vermont	13	8	4	1	17
South Atlantic . . . . . Total	192	104	63	92	341
Delaware	12	7	4	4	16
District of Columbia	41	32	21	26	72
Florida	32	14	7	11	53
Georgia	11	1	2	4	17
Maryland	36	14	14	18	65
North Carolina	12	9	1	3	26
South Carolina	6	4	5	3	16
Virginia	30	11	4	17	51
West Virginia	12	12	5	6	25
South Central . . . . . Total	98	45	35	44	196
Alabama	10	5	2	6	22
Arkansas	8	2	3	2	16
Kentucky	14	4	3	3	18
Louisiana	5	5	4	7	24
Mississippi	6	2	5	5	11
Tennessee	20	12	3	7	32
Texas	35	15	15	14	73
North Central . . . . . Total	363	169	123	151	664
Illinois	106	51	31	45	181
Indiana	19	8	6	7	25
Iowa	5	2	2	2	16
Kansas	13	4	4	7	22
Michigan	39	26	13	16	79
Minnesota	20	6	11	10	40
Missouri	39	18	19	23	75
Nebraska	10	7	3	3	16
North Dakota	5	2	2	2	8
Ohio	90	35	26	24	158
South Dakota	3	—	—	—	5
Wisconsin	14	10	6	12	39
Western . . . . . Total	136	72	41	56	258
Arizona	3	2	—	2	4
California	42	26	14	21	95
Colorado	19	8	2	1	17
Idaho	1	—	—	—	9
Montana	7	4	2	1	6
Nevada	1	1	—	1	4
New Mexico	4	2	—	1	10
Oklahoma	11	8	8	7	29
Oregon	16	10	3	4	20
Utah	4	4	4	2	8
Washington	27	7	7	12	54
Wyoming	1	—	1	4	2
Territories and Dependencies . . . . Total	13	12	10	7	13
Alaska	—	—	—	1	—
Canal Zone	1	—	—	—	—
Hawaii	5	2	2	1	7
Puerto Rico	7	10	8	5	6
Total for United States	2,870	1,404	966	1,301	4,913

(*Continued on page 47*)

TABLE 6 — (*Continued*)

Foreign Countries	1942	1943	1944	1945	1946
Total	178	175	232	237	259
Argentina	7	9	12	5	8
Bahamas	1	—	—	—	—
Belgian Congo	—	—	—	1	1
Bolivia	2	1	1	1	—
Brazil	13	11	15	11	9
British Honduras	—	—	—	—	1
British West Indies	1	1	1	2	3
Canada	21	12	9	10	53
Chile	3	2	3	3	2
China	31	34	82	69	24
Colombia	4	3	5	3	3
Costa Rica	—	—	—	1	1
Cuba	15	14	10	12	17
Cyprus	—	—	—	—	1
Czechoslovakia	—	—	1	—	—
Denmark	—	—	—	—	2
Dominican Republic	1	2	1	—	—
Ecuador	1	—	1	1	—
Egypt	—	—	1	1	1
England	—	—	—	—	7
Finland	1	—	—	—	—
France	—	—	—	2	5
French West Indies	—	—	—	—	1
Greece	1	—	—	—	—
Guatemala	4	3	3	4	2
Haiti	—	1	—	—	—
Honduras	1	—	—	2	1
Iceland	1	1	2	5	5
India	7	7	21	27	13
Iran	1	1	2	4	—
Iraq	—	—	1	9	4
Italy	—	—	—	—	2
Lebanon	—	—	1	1	2
Libya	—	—	—	—	1
Luxembourg	—	—	—	—	1
Mexico	12	10	10	9	10
Netherlands	—	—	1	1	2
Newfoundland	—		—	—	1
Nicaragua	1	1	—	—	—
Norway	—	—	—	1	22
Palestine	—	—	—	1	1
Panama	—	—	4	5	5
Peru	7	10	10	13	10
Philippines	5	2	—	—	7
Poland	—	—	—	2	1
Portugal	1	—	—	—	1
Rhodesia	—	—	—	—	1
Salvador	1	1	1	—	2
Scotland	—	—	—	—	1
Spain	—	—	—	—	1
Straits Settlements	1	1	—	1	—
Sweden	—	—	—	—	2
Switzerland	2	—	—	—	2
Turkey	17	35	18	15	11
Union of South Africa	2	1	2	5	4
Uruguay	5	3	1	2	1
Venezuela	8	9	13	8	4
Grand Total, United States and Foreign	3,048	1,579	1,198	1,538	5,172

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	9	9	3	3	24
Second Year	2	4	2	43	51
Third Year	—	1	5	2	8
Fourth Year	—	—	—	—	—
Graduate Year	—	—	89	234	323
Total	11	14	99	282	406

TABLE 8

Women Students Classified by Courses and Years

	Course	Year					Total
		1	2	3	4	G	
I	Civil Engineering	—	—	1	—	—	1
II	Mechanical Engineering	—	—	—	—	1	1
III	Metallurgy	—	—	—	—	1	1
IV	Architecture	4	1	2	1	3	11
	Fifth Year	—	—	—	3	—	3
V	Chemistry	1	4	3	4	—	12
VI	Electrical Engineering	—	1	—	1	4	6
VII	Quantitative Biology	—	—	2	—	5	7
VIII	Physics	—	1	—	—	6	7
IX-B	General Engineering	—	—	—	1	—	1
X	Chemical Engineering	2	2	3	—	—	7
XII	Geology	—	—	—	—	3	3
XVI	Aeronautical Engineering	—	1	—	—	1	2
XVII	Building Engineering and Construction	—	—	—	—	1	1
XVIII	Mathematics	—	—	1	1	7	9
XIX	Meteorology	—	—	—	—	1	1
	Industrial Economics	—	—	—	—	2	2
	Total	7	10	12	11	35	75

TABLE 9

Old and New Students

Year	1941–42	1942–43	1943–44	1944–45	1945–46	1946–47
Students registered at end of last academic year (including specials)	1,897	1,936	855	500	653	2,762
Students who have previously attended the Institute, but were not registered at end of last academic year (including specials)	77	84	37	98	62	1,242
New students who entered by examination	318	212	190	118	313	460
New students who entered without examination	264	462	351	266	336	241
New students who entered from other colleges as candidates for degrees	367	326	124	179	136	406
New students (specials, not candidates for degrees)	132	28	22	37	38	61
Total	3,055	3,048	1,579	1,198	1,538	5,172

TABLE 10. List of American Colleges and Universities with Number of Graduates Attending the Institute

College		College		College	
Adelphi College	1	Louisiana State University and Agric. and Mech. Coll.	5	Texas College of Arts and Industries	1
Alabama Polytechnic Inst.	9	Loyola University	1	Texas Technological College	5
Alfred University	5	Manhattan College	1	Tri-State College	2
American University	1	Marquette University	2	Tufts College	16
Amherst College	7	Massachusetts Inst. of Tech.	149	Tulane Univ. of Louisiana	8
Augustana College and Theological Seminary	1	Massachusetts School of Art	1	Union College (N. Y.)	8
Bates College	2	Massachusetts State College	4	U. S. Coast Guard Academy	10
Bethany College	2	Miami University	1	U. S. Military Academy	35
Birmingham-Southern College	2	Michigan Central State Teachers College	1	U. S. Naval Academy	152
Boston College	8	Michigan College of Mining and Technology	4	University of Akron	1
Boston University	5	Michigan State Normal Coll.	2	University of Alabama	2
Bowdoin College	8	Middlebury College	2	University of Arkansas	3
Brooklyn College	6	Milwaukee State Teachers' Coll.	1	University of Buffalo	2
Brooklyn Polytechnic Inst.	8	Mississippi State College	3	University of California	21
Brown University	14	Missouri School of Mines	3	University of California at Los Angeles	7
Bryn Mawr College	3	Montana School of Mines	4	University of Chicago	14
Bucknell University	3	Montana State College	3	University of Cincinnati	3
California Inst. of Tech.	12	Morehouse College	1	University of Colorado	5
Canisius College	1	Mt. Holyoke College	4	University of Delaware	4
Carleton College	1	Muhlenberg College	1	University of Denver	2
Carnegie Inst. of Technology	10	Newark College of Engineering	3	University of Florida	4
Case School of Applied Sc.	11	Newcomb College	1	University of Idaho	4
Central College of Missouri	1	New Jersey Coll. for Women	1	University of Illinois	20
Chicago Teachers' College	1	New York University	21	University of Indiana	2
Citadel, The	1	Niagara University	1	University of Kansas	6
Clark University	1	North Carolina State Coll.	6	University of Kentucky	3
Clarkson Coll. of Technology	1	North Central College	1	University of Louisville	2
Clemson College	3	North Dakota St. Teach. Coll.	1	University of Maine	7
Colby College	4	Northeastern University	16	University of Maryland	3
College of the City of N. Y.	24	Northern Illinois Coll. of Op.	1	University of Michigan	11
College of Wooster	4	North Texas State College	1	University of Minnesota	18
Colorado College	1	Northwestern University	4	University of Mississippi	1
Colorado School of Mines	2	Norwich University	2	University of Missouri	1
Columbia University (N. Y.)	12	Oberlin College	5	University of Nebrasks	6
Cooper Union	3	Ohio Northern College	1	University of Nevada	1
Cornell University	12	Ohio State University	10	University of New Hampshire	13
Creighton University	1	Ohio Wesleyan University	1	University of New Mexico	3
Dartmouth College	11	Oklahoma Agric. and Mech. College	2	University of North Carolina	4
Davidson College	2	Oregon State College	3	University of North Dakota	3
Davis and Elkins College	1	Pennsylvania State College	21	University of Notre Dame	5
Denison University	2	Philadelphia College of Phar. and Science	1	University of Oklahoma	8
DePauw University	3	Pomona College	5	University of Pennsylvania	9
Dickinson College	2	Pratt Institute	2	University of Pittsburgh	3
Drexel Inst. of Technology	5	Pres. Coll. of South Carolina	1	University of Rochester	6
Duke University	6	Princeton University	19	University of South. Calif.	2
East Texas State Teachers' College	2	Purdue University	15	University of South Carolina	2
Eastern Kentucky State Teachers' College	1	Queens College (N. Y.)	1	University of Texas	13
Emmanuel College	2	Radcliffe College	5	University of Toledo	2
Emory University	1	Reed College	2	University of Utah	5
Erskine College	1	Rensselaer Polytechnic Inst.	16	University of Vermont	3
Fordham University	1	Rhode Island State College	2	University of Virginia	5
Franklin and Marshall Coll.	2	Rice Institute	9	University of Washington	24
Furman University	1	Rose Polytechnic Institute	1	University of Wisconsin	9
George Washington Univ.	2	Rutgers University	7	Ursinus College	2
Georgetown University	1	St. Louis University	1	Utah State Agric. College	1
Georgia School of Technology	21	St. Michael's College	1	Vanderbilt University	4
Gettysburg College	1	Simmons College	1	Vassar College	1
Goucher College	1	Smith College	3	Villanova College	4
Greenville College	1	Sophie Newcomb College	1	Virginia Military Institute	3
Grinnell College	1	South Dakota State School of Mines	1	Virginia Polytechnic Inst.	8
Grove City College	1	Southern Methodist Univ.	1	Washburn College	1
Hamilton College	1	Southwestern College	3	Washington-Jefferson Coll.	2
Harvard University	42	Southwest. Louisiana Inst. of Liberal and Tech. Learning	1	Washington University	6
Haverford College	3	Southwest Texas State Coll.	1	Wayne University	2
Holy Cross, College of the	5	Springfield College	1	Webb Institute of Naval Arch.	7
Houghton College	1	Stanford University	12	Wellesley College	5
Howard College	1	State College of Washington	2	Wesleyan University	2
Hunter College	1	State University of Iowa	2	Weston College	1
Huron College	1	Stephen F. Austin State Teachers College	1	Whittier College	1
Illinois Inst. of Technology	8	Stevens Inst. of Technology	5	William and Mary College	3
Iowa State College	10	Susquehanna University	1	William Jewell College	1
Iowa Wesleyan College	1	Swarthmore College	4	Williams College	10
Jefferson College	1	Syracuse University	3	Wittenberg College	2
Johns Hopkins University	4	Temple University	3	Worcester Polytechnic Inst.	11
Johnson C. Smith University	1	Texas Agricultural and Mech. College	7	Yale University	27
Juanita College	2				
Kansas State College of Agric. and Applied Science	5			Total	1,413
Kenyon College	1			Number of American Colleges Represented	231
LaSalle College	1			Number of Foreign Colleges Represented (not listed)	76
Lawrence College	1			Total	307
Lehigh University	11				

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			Entered							
				Nov. 1946		Previous Years					
	Nov. 1946	Previous Years	Total	Undergrad.	Grad.	Undergrad.	Grad.	Total	S.B. Degree 1946	Other Graduates	Total
Aeronautical Engineering XVI	2	59	61	—	41	4	35	80	4	24	28
Architecture IV, IV-B	15	14	29	9	13	9	24	55	—	3	3
Biology VII, VII-A	—	6	6	—	7	1	8	16	—	7	7
Building Engineering and Construction XVII	1	10	11	—	5	4	1	10	—	—	—
Business and Engineering Administration XV	—	71	71	—	9	10	19	38	—	3	3
Chemical Engineering X, X-A	2	68	70	—	30	8	86	124	10	32	42
Chemistry V	—	11	11	—	34	1	72	107	1	27	28
Civil Engineering I	1	33	34	—	15	2	34	51	1	9	10
Economics and Engineering XIV	—	2	2	—	—	—	—	—	—	—	—
Electrical Engineering VI, VI-A	10	160	170	35	50	75	78	238	16	28	44
Food Technology XX	—	2	2	—	1	—	3	4	—	6	6
General Engineering IX-B	—	11	11	—	—	—	—	—	—	—	—
General Science IX-A	—	—	—	—	—	—	—	—	—	—	—
Geology XII	—	—	—	—	4	—	7	11	1	4	5
Industrial Economics	—	—	—	—	11	—	13	24	—	3	3
Mathematics XVIII	1	1	2	—	14	1	22	37	3	13	16
Mechanical Engineering II	3	130	133	—	26	29	44	99	4	31	35
Metallurgy III	—	8	8	—	14	2	35	51	—	18	18
Meteorology XIX	—	7	7	—	8	3	20	31	—	1	1
Naval Architecture and Marine Eng. XIII, XIII-C	3	15	18	—	2	1	5	8	—	1	1
Naval Construction and Engineering XIII-A	—	—	—	—	—	49	28	77	—	—	—
Physics VIII	1	28	29	—	29	4	89	122	1	30	31
Sanitary Engineering XI	—	—	—	—	10	—	4	14	—	—	—
Total	39	636	675	44	323	203	627	1,197	41	240	281

TABLE 12. NUMBER OF DEGREES AWARDED IN SEPTEMBER 1946, FEBRUARY 1947, AND JUNE 1947

Name of Course	S.B.			B.Arch. and B.C.P.			S.M.			M.Arch. and M.C.P.			Ph.D.			Sc.D.			Total		
	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June	Sept.	Feb.	June
Aeronautical Engineering	15	9	42	—	—	—	15	5	38	—	—	—	—	—	—	1	—	2	31	14	82
Architecture	—	—	—	2	1	7	—	—	—	2	4	8	—	—	—	—	—	—	4	5	15
Biology	—	—	—	—	—	—	—	1	1	—	—	—	—	1	1	—	—	—	—	2	2
Building Engineering and Construction	3	2	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	2	6
Business and Engineering Admin.	19	25	90	—	—	—	4	4	10	—	—	—	—	—	—	—	—	—	23	29	100
Ceramics	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Chemical Engineering	16	33	61	—	—	—	14	31	17	—	—	—	—	—	—	6	5	4	36	69	82
Chemical Engineering Practice	—	—	—	—	—	—	—	4	12	—	—	—	—	—	—	—	—	—	—	4	12
Chemistry	4	4	12	—	—	—	3	5	3	—	—	—	1	4	7	—	—	—	8	13	22
City Planning	—	—	—	—	—	1	—	—	—	5	9	3	—	—	—	—	—	—	5	9	4
Civil Engineering	4	15	18	—	—	—	6	5	32	—	—	—	—	—	—	1	1	1	11	21	51
Economics and Engineering	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
Electrical Engineering	15	48	80	—	—	—	20	9	24	—	—	—	—	—	1	1	1	3	36	58	108
Food Technology	—	2	4	—	—	—	—	3	1	—	—	—	—	—	—	—	—	1	—	5	6
General Engineering	7	8	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	8	15
General Science	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Geology	1	—	—	—	—	—	1	—	4	—	—	—	—	—	—	—	—	—	2	—	4
Industrial Economics	—	—	—	—	—	—	—	—	—	—	—	—	1	—	2	—	—	—	1	—	2
Marine Engineering	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	—	—	—	—	—	3
Marine Transportation	1	1	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	4
Mathematics	2	1	6	—	—	—	1	1	5	—	—	—	1	1	—	—	—	—	4	3	11
Mechanical Engineering	21	38	85	—	—	—	14	19	25	—	—	—	—	—	—	1	1	—	36	58	110
Metallurgy	3	7	11	—	—	—	1	4	5	—	—	—	—	—	—	1	2	6	5	13	22
Meteorology	1	3	8	—	—	—	—	1	5	—	—	—	—	—	—	—	—	1	1	4	14
Naval Architecture	—	—	—	—	—	—	3	2	2	—	—	—	—	—	—	—	—	—	3	2	2
Naval Arch. and Marine Engineering	5	1	20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1	20
Naval Construction and Engineering	—	—	—	—	—	—	30	—	—	—	—	—	—	—	—	—	—	—	30	—	—
Physical Biology	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Physics	1	7	19	—	—	—	2	—	2	—	—	—	—	2	4	1	—	—	4	9	25
Quantitative Biology	—	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
Sanitary Engineering	—	—	—	—	—	—	1	—	13	—	—	—	—	—	—	—	—	—	1	—	13
Textile Technology	—	—	—	—	—	—	2	—	4	—	—	—	—	—	—	—	—	—	2	—	4
Without Course Classification	—	—	—	—	—	—	4	3	6	—	—	—	—	—	—	—	—	—	4	3	6
Total	119	204	484	2	1	8	121	97	213	7	13	11	3	8	15	12	10	18	264	333	749

TABLE 13

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	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.	Physics	Sanitary Eng.	Total	Total by Decades
1868									1	6					1			1				6				14	
1869									1	2								2				2				5	
1870									1	4					1			2				2				10	29
1871									2	8								2				5				17	
1872									3	3								1				5				12	
1873			1						7	12				1				2				3				26	
1874			1							10				2				4				1				18	
1875			1						1	10				2				7				6		1		28	
1876			1	2					5	12								8				8		3		43	
1877			4						2	12								6				8				32	
1878			3						3	8				1				2				2				19	
1879			1	1					3	6								8				3		1		23	
1880									1	3				1								3				8	226
1881			3	1					8	3				2				5				6				28	
1882			3	1					6	2				1				5				5		1		24	
1883			1						3	3								7				5				19	
1884									12	5								6				13				36	
1885			2						4	4	2			1				7				8				28	
1886			1	1					7	9	10			1				23				7				59	
1887			1	1					9	10	8			3				17				8		1		58	
1888			5	3					10	11	17			1				25				4		1		77	
1889			3	1					8	14	17			2				24				5		1		75	
1890			5	3					13	25	18			6				28				3		2		103	507
1891			6	3			7		11	18	23			1		1		26				4		3		103	
1892			13	6			4		7	22	36			7		1		26				4		1	6	133	
1893			2	2			8		8	25	41			6		2		30				5				129	
1894			14	1			12		11	21	33			5				31				4		3	3	138	
1895			15				11		14	25	33			4				30				3	5	2	4	146	
1896			24	3			7		17	26	48			7	3			34				10	5	3	4	191	
1897			16	2			12		20	25	33			7	1			40				7	9	3	4	179	
1898			29	3			9		25	32	33			6				41				7	7	4	3	199	
1899			22	2			10		22	30	32			1				37				9	8	2	1	176	
1900			21	3			11		19	32	23			5				34				21	9	3	4	185	1,579
1901			21	1			14		17	37	25			6	1			39				18	16	1	4	200	
1902			18	5			9		14	24	35			3				46				14	14	3	7	192	
1903			15	1			10		13	26	39	1			1			37				27	12	3	4	190	
1904			24	3			7		15	34	34	8			1			45				32	17	5	2	232	
1905			12	3			13		23	46	31	3						54				26	24			244	
1906			22	2			10		21	47	37	3			5	1		69				38	19	4	6	278	
1907			21				14		10	37	32	5						52				22	10		3	208	
1908			19	4			15		16	48	38	2						62				19	5		2	230	
1909			18	5			13		12	51	42	3						41				30	5	3	9	232	
1910			18	3			18		10	57	36	3			2			57				24	11		12	251	2,257

(Continued on page 53)

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	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 Marine Eng.	Physics	Sanitary Eng.	Total	Total by Decades
1911	—	—	10	1	—	—	19	—	12	46	49	5	—	—	2	—	—	49	—	—	—	17	6	1	15	232	
1912	—	—	21	4	—	—	31	—	7	55	52	3	—	—	1	—	—	47	—	—	—	21	3	2	14	261	
1913	—	—	26	2	—	—	30	—	12	58	43	8	—	—	—	—	—	50	—	—	—	20	4	1	15	269	
1914	—	—	19	6	—	—	37	—	9	60	51	8	—	—	4	—	—	65	—	—	—	17	8	1	19	304	
1915	—	—	30	3	—	—	33	—	23	49	42	10	—	—	3	—	—	69	—	—	—	5	7	3	12	289	
1916	—	—	37	5	—	—	32	—	11	45	56	14	—	—	2	—	—	84	—	—	—	5	9†	3	18	321	
1917	—	—	27	10	—	37	43	—	13	49	45	10	—	—	5	2	—	63	—	—	—	14	9†	1	17	345	
1918	—	—	28	7	—	29	40	—	10	45	50	11	—	2	4	1	—	75	—	—	—	10	4	3	5	324	
1919	—	—	16	9	—	28	44	—	8	45	50	6	—	3	1	—	—	66	—	—	—	7	7	4	6	300	
1920	—	—	19	2	—	48	63	—	6	52	30	9	—	1	4	—	—	55	—	—	—	13	12	2	2	318	2,963
1921	—	—	11	3	—	70	92	—	9	98	75	15	—	15	—	3	—	128	—	—	—	24	11	1	3	565	
1922	—	—	32	8	—	126	98	15	11	65	109	25	—	25	1	8	—	56	—	—	—	27	16	8	7	637	
1923	—	13	18	6	—	115	73	19	16	64	78	16	—	23	2	8	3	106	—	—	—	23	13	9	3	608	
1924	—	6	15	6	—	82	57	8	13	69	125	17	—	36	4	2	1	82	—	—	—	19	11	3	1	557	
1925	—	6	18	2	—	94	53	8	18	57	110	9	—	37	2	3	2	98	—	—	—	23	10	5	—	555	
1926	—	9	24	5	—	95	45	13	19	76	108	14	—	33	2	4	1	76	—	—	—	20	14	1	2	561	
1927	2	15	19	6	—	89	39	6	13	73	121	8	—	22	2	3	3	72	—	—	1	9	4	4	3	514	
1928	8	19	16	5	—	73	38	7	13	59	114	11	—	12	2	1	3	67	—	—	—	12	3	3	5	471	
1929	29	25	26	7	9	69	37	11	18	46	84	10	—	14	1	2	5	64	—	—	—	11	5	4	6	483	
1930	29	15	44	9	23	59	39	12	11	46	76	8	—	9	1	2	1	48	—	—	—	6	6	11	4	459	5,410
1931	39	10	18	16	15	68	32	10	12	49	83	6	—	22	5	3	4	70	—	—	—	12	13	7	2	496	
1932	27	16	5	15	18	70	45	7	15	38	74	4	—	29	3	2	3	68	—	—	4	21	16	21	4	505	
1933	27	9	—	13	9	56	38	3	18	47	86	8	—	16	3	2	7	86	—	—	—	14	13	14	2	471	
1934	26	10	—	16	13	78	48	6	15	35	82	7	—	8	9	1	8	50	—	—	—	26	25	28	5	496	
1935	27	8	—	18	8	74	43	5	15	18	57	8	—	19	4	1	3	45	—	—	—	14	14	19	1	401	
1936	27	3	—	13	12	63	31	20	16	23	68	5	—	25	6	2	8	47	—	—	—	10	18	11	2	410	
1937	30	3	—	9	4	61	34	9	13	15	67	5	—	20	4	—	4	46	—	—	—	19	19	17	1	380	
1938	25	3	—	11	4	56	51	6	14	22	62	4	—	28	6	1	2	50	10	—	—	5	23	14	2	399	
1939	30	2	—	6	7	56	53	12	25	23	67	7	—	19	13	4	2	72	20	—	—	9	8	17	1	453	
1940	29	—	—	12	9	59	59	12	23	14	73	2	—	36	20	6	7	68	22	—	—	7	24	22	—	504	4,515
1941	36	—	—	6	7	59	54	8	28	22	79	—	—	23	5	8	6	90	29	—	—	—	18	23	—	501	
1942	39	—	—	17	3	61	60	8	34	16	66	—	—	20	11	5	4	98	34	—	—	—	29	25	1	531	
1943	38	—	—	10	5	49	49	14	21	14	83	—	—	18	11	2	6	80	24	—	—	—	33	14	1	472	
1944	57	—	—	4	3	28	41	20	12	18	47	—	—	14	4	1	2	78	8	—	—	—	37	20	2	396	
1945	22	—	—	1	1	22	36	—	5	9	45	—	—	6	1	—	5	70	3	—	—	—	13	16	—	255	
1946	84	—	—	—	5	33	59	—	9	13	91	—	1	12	2	1	4	93	7	24	—	—	29	12	—	479	
§1947	51	—	—	2	8	115	94	—	16	33	128	—	6	23	1	—	7	123	18	11	—	—	26	26	—	688	
Total	682	172	865	341	163	2,022	1,984	239	957	2,411	3,482	301	7	570	250	92	101	3,677	175	35	5	880	703	430	264	20,808	

* Prior to 1909 this Course was designated as Option 3 (Electrochemistry) of Course VIII. Discontinued 1940.
† 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)	Business and Eng. Admin.	Ceramics	Chemical Engineering	Chem. Eng. Practice X-A	Chemistry	Civil Engineering	Economics and Engineering	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																	1
1887								1																	1
1888																									
1889																									
1890																									
1891																									
1892																									
1893		1																							1
1894									1																1
1895		1						1														1			3
1896		2						1																	3
1897		2				1																1			4
1898		1				2										1						1			5
1899		1	1					1																	3
1900																									
1901		2														2									4
1902		3						3								2									8
1903		5														1							1		7
1904		4						1			2					1				3		1			12
1905		9																		8			1		18
1906		3						1											2	3					9
1907		6				1														8					15
1908		1						1			3									7					12
1909		6				1		1	2		1		1			1				3		1			17
1910		6	1					1	2		1					1				7					19
1911		5	2					2	2		4					2				3					20
1912		4	2					3	3		2									4			2		20
1913		4	1			7			1		1		1			2				2					19
1914		3	2			3		5	3		2		1			1				2			3		25
1915	1	4				2		2	1		10					4			1	2					27
1916	5	7	1			1		3	5		6					4				2			1		35
1917	4	3				1		1	3		5					1				9		1	2		30
1918	5	1	1			1		1	1		2					2								1	15
1919	2							3	4		4				1	1									15
1920			1			3		2	4		7		3		1	5				19		1		4	50
1921	3					29		6	2		4		2			10				20				17	93
1922	5					6	32	4	5		37		2		2	4				10		1		18	126
1923	10					3	34	1	5		45		2			15	1		4	21		3		26	170
1924	4					6	41	1	5		34		1			8	1			12		5		28	146
1925	5			1		3	35	3	5		35					10	2					2	1	21	123
1926	6					5	20	2	2		60	3				6	1			12				25	142
1927	9		1			2	26	4	6		54	6	3		1	13				6		1		32	161
1928	9					5	14	2	8		63		2		2	13				9		1		43	169
1929	5			2		3	21	4	6		79	4			2	16				6		2	1	45	196
1930	3			1		7	22	5	9		51	1			2	5	3			5		1	1	53	170
1931	4	2	5			15	34	5	12		57	2			5	10	4	4		8		2		20	189
1932	5	5	9			25	33	8	17		56	2			3	16	1	4		7		6		40	237
1933	10	1	5			14	26	7	12		46				1	18	2		1	13		4	2	20	182
1934	7	5	5			16	19	11	9		46		3		3	20	5	1		11		3	1	21	186
1935	3	1	2			16	14	4	13		55				3	16	6			10		7	2	21	173
1936	5		4	2		7	30	3	19		22		2		2	14		4	1	7	1	5		23	151
1937	12	1	5	1		12	29	8	17	7	35				1	15	4	4		8	1	2	1	23	186
1938	13		8			11	28	1	29	2	58				1	24	1	4		7	1	3		30	221
1939	8	3	8			20	34	1	31	3	45		2		1	21	6	6		8		5	2	28	232
1940	9	1	9			16	37	3	20		54		4		5	22	7	8	18	10	2	3	2	37	267
1941	16	1	12			15	42	3	10	3	35		3	1	2	25	7	18	14	22		4	1	25	259
1942	9	2	16	1		12	23	2	5	1	24		2	15	1	24	8	11		9			1	7	173
1943	21	1				15	36	3	9		30		2	7		26	5	14		18		2	1	4	194
1944	22		1	1		3	7	2	9		13					12	5	11	1	55			3	5	150
1945	9	3	1			12		3	5		25				2	11	7	6		23		2	3	9	121
1946	47	1	4			29	2	5	24		45		2		5	47	4	5	3	46		2	4	9	284
*1947	43	2	14			48	16	8	37	1	33	4	4	3	6	48	9	6	4			2	13	9	310
Total	319	84	42	112	5	378	655	144	363	17	1,191	4	55	26	52	500	89	106	50	445	5	75	49	644	5,410

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	5,536

* 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	8	1	12	12
Total	216	18	173	59

* Includes only February and June degrees.
† From 1935 to 1944 Bachelor of Architecture in City Planning.

TABLE 16

Degrees of Master in Public Health Awarded
(Discontinued after 1944)

Class (Calendar Year)	Number
1941	3
1942	11
1943	10
1944	7
Total	31

TABLE 17

Degrees of Doctor of Philosophy Awarded

Class (Calendar Year)	Biology	Chemistry	Electrical Engineering	Food Technology	Geology	Industrial Economics	Mathematics	Physics	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	2	11	1	—	—	2	1	6	23
Total	39	310	1	1	48	7	44	94	544

* Includes only February and June degrees.

TABLE 18. DEGREES OF DOCTOR OF SCIENCE AWARDED

Class (Calendar Year)	Aero. Eng.	Ceramics	Chem. Eng.	Chemistry	Civil Eng.	Elec. Eng.	Electrochem. Eng.	Food Technology	Geology	Mathematics	Mech. Eng.	Metallurgy	Meteorology	Min. Eng.	Naval Arch.	Petroleum Eng.	Physics	San. Eng.	Total
1911	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
1912	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1913	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1914	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1915	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
1916	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
1917	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
1918	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1919	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1920	1	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—	—	3
1921	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1922	1	—	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	3
1923	1	—	—	—	—	—	—	—	1	—	—	1	—	—	—	—	2	—	5
1924	—	—	2	—	—	1	—	—	1	—	—	1	—	—	—	—	1	—	6
1925	1	—	3	—	—	—	—	—	—	—	—	3	—	—	—	—	—	—	7
1926	—	—	1	1	1	1	1	—	—	—	—	4	—	—	—	—	—	—	9
1927	—	—	—	—	—	1	—	—	—	1	1	2	—	—	—	—	1	—	6
1928	1	—	5	—	1	2	—	—	—	—	—	1	—	—	—	—	—	—	10
1929	—	—	3	—	—	—	—	—	—	—	—	1	—	—	1	—	1	—	6
1930	—	—	9	—	—	6	—	—	—	1	3	1	—	—	—	—	—	—	20
1931	—	—	3	2	—	3	—	—	—	—	—	1	—	—	—	—	—	—	9
1932	—	—	5	—	1	2	—	—	1	—	2	1	—	—	—	—	2	—	14
1933	—	—	10	1	2	3	—	—	—	1	—	6	—	1	—	—	—	—	24
1934	—	—	3	—	—	2	1	—	1	—	3	2	1	—	—	—	—	—	13
1935	—	1	2	1	—	4	—	—	—	2	—	1	1	—	—	—	1	1	14
1936	2	1	12	—	—	1	—	—	—	—	2	3	—	1	—	—	2	—	24
1937	1	1	9	1	1	6	—	—	—	—	2	—	—	—	—	1	1	—	23
1938	—	1	12	—	2	7	—	—	1	—	2	5	3	—	—	—	5	—	38
1939	2	1	10	—	3	1	—	—	—	—	—	4	1	1	—	—	3	—	26
1940	—	2	12	—	3	1	—	—	1	—	2	2	—	1	—	—	4	1	29
1941	1	1	15	3	—	3	—	—	—	—	3	8	3	—	—	—	3	1	41
1942	1	2	14	—	2	—	—	—	—	—	1	3	1	—	—	—	2	—	26
1943	—	2	10	—	—	1	—	—	—	—	—	5	—	—	—	—	2	—	20
1944	2	—	4	—	—	1	—	—	2	—	1	4	—	—	—	—	1	—	15
1945	—	1	7	—	2	—	—	—	—	—	1	3	1	—	—	—	—	—	15
1946	1	—	11	—	3	1	—	—	1	—	2	1	2	—	—	—	1	—	23
*1947	2	—	9	—	2	4	—	1	—	—	1	8	1	—	—	—	—	—	28
Total	18	13	171	10	23	55	2	1	10	5	26	71	14	5	1	1	32	3	461

*Includes only February and June degrees.

TABLE 19

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 20

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 21

Summary of Degrees Awarded (1868–1947)

Bachelor of Science	20,808
Bachelor in Architecture	216
Bachelor in City Planning	18
Master of Science	5,536
Master in Architecture	173
Master in City Planning	59
Master in Public Health (Discontinued after 1944)	31
Doctor of Philosophy	544
Doctor of Science	461
Doctor of Public Health (Discontinued after 1944)	9
Doctor of Engineering (Discontinued after 1918)	4
Grand Total	27,859

Director of Admissions

In accordance with the practice of previous years, this report covers the twelve-month period ending with the opening of the new academic year on September 29, 1947; this date marks the natural termination of the Admissions Office year.

Applications continued at the very high rate which has characterized the postwar period, though there was some reduction in the number of veterans who called in person. This easing of the interviewing load, together with the presence of John W. Sheetz, 3d, on the full-time staff of the office, and part-time assistance from Frederic W. Watriss and Professor Gerald Putnam, made it possible to relieve the volunteer counselor group which had rendered such signal service during the emergency of the demobilization period.

First-year classes were admitted in February and September, 1947, as indicated below:

First-Year Classes

	February 1947	*September 1947*
Total Applications	1,053	4,354
Admissions Granted*	289	1,106
Actual Registration*	261	851
Registration as Per Cent of Admissions	90.4	77.0

* Exclusive of former students returning in the first year.

Total first-year applications for September, 1947, were thus somewhat higher than the year before (4,045). It should, however, be noted that a June class entered in 1946 but not in 1947, so that in the latter year those interested in June admission would be likely to merge into the fall group. If, therefore, we compare the September, 1947, figure of 4,354 with the June-September total of 1946 (4,481), it appears that the crest of first-year applications for the postwar period has been passed. These figures compare with 1,844 for September, 1941, the last prewar year. The proportion of veterans at the first-year level shows a sharp decrease, being now about one-quarter.

There is an increasing tendency for students to submit duplicate applications to several colleges. This, together with

the increase in tuition, probably explains the increased amount of shrinkage between the admitted group and those who actually registered. This shrinkage was 16½ per cent in 1946 and 23 per cent in 1947. As in 1938, the last previous year which saw a rise in tuition, the rise seemed to have no effect on applications. The shrinkage due to cancellation during the summer, however, jumped in 1938 from 13.5 per cent to 17.2 per cent and continued higher in succeeding years. We may therefore hazard the rough estimate that of the total 23 per cent shrinkage this year, roughly one-half was due to higher tuition and one-half to the prevailing tendency to submit applications which are not followed up.

In December, 1946, the Committee on Stabilization of Enrollment ruled that college transfer applications for 1947–1948 should be accepted only in certain of the less crowded Courses and only at the third- or fourth-year levels, the chief exception being entrants under the Combined Plan of Study and naval officers entering the Radar option in Electrical Engineering. The very large number of inquirers about transfer were therefore met, in each case, with an offer to hold a preliminary application on file for September, 1948, or later, pending detailed determination of the Courses in which, and the levels at which, it might be possible to accept some transfers at that date. Some 1,100 preliminary applications are currently on file on this basis.

The Combined Plan of Study with liberal arts colleges shows evidence of resumption on an increased scale following the interruption brought about by the war. A total of twenty-one students entered this year under the plan. A preliminary registration conducted last May through the twelve colleges in the plan yielded a total of 352 students then in college who signified an intention of following the plan in the ensuing three years. This should yield a substantial group of entrants, even after allowing for the considerable number who will change their plans or fail to qualify. The Institute has agreed to accept all students who qualify under the plan, whether their stay in college be three or four years. Notice has been given, however, that beginning in 1948, accepted applicants will be subject to the same procedure of redistribution among Courses

to relieve the more crowded departments as is now in effect for all Institute students beginning with the Class of 1950.

The procedure of handling applications from special students has been reorganized, and a term-by-term recheck on the performance and qualifications of these students established.

Professor George P. Wadsworth and J. G. Bryan have been engaged during the past year, at the request of the Admissions Office, on an extensive statistical study of the data accompanying applications for admission, in order to determine their predictive efficacy. While it is not expected that the selection of candidates for admission can ever be reduced solely to the dimensions of a statistical problem, it is important to ascertain whether the selective process as now conducted does in fact exhaust the predictive value of such evidence as is available (including various kinds of tests), before falling back on those estimates of imponderables which will always require the exercise of judgment. The study, which is still in progress, seeks to shed light on this complex but vital problem.

B. Alden Thresher

Director of Libraries

The Director of Libraries is responsible, broadly, for the activities of the Library and of the Museum. The report which follows is based upon more detailed reports rendered by William N. Seaver, Librarian, and Professor Herbert L. Beckwith, Director of Exhibits.

The Library

Next year, for the first time, the Library will issue an extended separate report, probably in January, 1948. The following is a condensed version of points to be elaborated there.

Use. Circulation is but a rough guide to the services of a library such as ours, but it is a signpost. Before 1939, circulation had increased year by year to a peak of 135,000. The war years brought a steady decline to a low of 111,000 in 1944. Then the curve turned sharply upward and continued to climb to a new record of 160,000, an increase of 35 per cent over 1945–1946. Percentagewise the increase was considerably greater

than that of the population served. A similar upward trend is demonstrated in reference statistics. Last year's report noted that our loans to other libraries had tripled since 1939. The trend continues and a further increase of 20 per cent over last year is salutary indication of the quality of our collection and of our lending service. We borrowed 748 items on interlibrary loan this year from a total of seventy-four different libraries, Harvard University alone supplying 387 items; but we loaned more than eight times as much, a total of 6,126 items to one hundred different libraries.

This year the reference desk answered 2,900 desk questions, an increase of 80 per cent over last year; answered 7,100 telephone calls, an increase of 12 per cent; prepared 30 special bibliographies for an increase of 90 per cent (which would be more impressive if the total were not still small); and arranged for 125 special conferences, an increase of 400 per cent. Only the number of photostats (735) and microfilms (243) supplied remained practically constant. Even here it is interesting that 209 of the microfilm requests were orders for copies of M. I. T. theses, which are in greatly increased demand since the war.

Registration of readers was up and, in general, was far from limited to specialists in the fields served by a particular library. More than half the registrants of the Rotch Library (Architecture and City Planning) were from other departments and, indeed, every department of the Institute was represented. Of over 2,000 registered users of the Eastman Library, less than one-third were from the departments of Mathematics, Chemistry, and Physics which it is designed primarily to serve. The 1,661 registrants in the Walker Memorial Library (English, history, and recreational) were, naturally, drawn from every department.

All of these marked increases have occurred without any corresponding increase in personnel; this has simply meant additional work for willing people and the postponement of other things, both creative and routine, which need to be done. The Eastman Library, for example, has seen its work expand fourfold in the past fifteen years without any increase in staff. The situation is near the breaking point.

Growth. All through the war, annual accessions were

smaller than usual, due primarily to the drying up or inaccessibility of foreign markets. Our total for last year, approximating that of the various war years, was some 7,000 volumes. This year a preliminary estimate suggests that we have added some 15,000 volumes, carrying our total holdings for the first time over the 400,000 mark. In addition we have much unprocessed and hence uncounted material, including 4,500 reports of the Office of Scientific Research and Development and 16,000 maps from the Army and the Navy, which is but a trickle of the flood to come.

This marked move upward is due only slightly to a more liberal annual purchase budget and even less to gifts. Neither the annual purchase allotments nor the gifts can be conceded to be consistent with what might be expected for a library of our stature. Rather the large increase is due to the opening of channels long closed and the procurement of back material, mostly from Europe, with funds which were prudently set aside years ago from the Library Growth Fund to meet precisely this emergency. These funds have been applied to the Cooperative Acquisitions Project directed by the Library of Congress, which up to the end of the year had sent us nearly 2,100 European publications, of which 950 were units of periodicals; to the Library of Congress mission in Europe, which arranged for the shipment of a large consignment of German periodicals which survived the disasters of war and had been saved for us by our Leipzig agent, Otto Harrassowitz, and were released by the Russian occupying authorities; to a barter arrangement with certain societies of the Soviet Union, which has brought us some useful material; and to the purchase of many lacunae in the biological collections, along lines laid down by Harold J. Oatfield, Library Fellow in Biology.

We have received more government documents than heretofore as a consequence of our first year as a United States documents depository. The Office of the Documents Expediter, to which we subscribe through the Association of Research Libraries, has sent us several thousand documents, not all of which could be kept. From the Office of Technical Services of the Commerce Department alone we have purchased and received 2,300 microfilm reports on German industrial develop-

ment and wartime research. The quantity of documents from government sources seems to continue in never abating flood; the quality is most variable; the problem of incorporating them into a library collection is severe, for the book is a conventional entity while the document is not. The library world must nonetheless soon face the reality that documents are playing an increasingly important role in university scholarship.

Acknowledgment and enumeration of gifts will be reserved for the extended report. Particularly noteworthy, however, were the gift from Melville Eastham of a valuable collection on microscopy, including many rare items; the gift of 110 volumes from the Consejo Superior de Investigaciones Científicas of Madrid; gifts of 40 to 100 volumes each from William W. Lewis, '89, George E. Marsh, '02, and Mrs. E. Kendall Bragg. The Heritage Collection of the projected Hayden Library became an actuality with the presentation of several handsome editions by the 5:15 Club, a student organization that fittingly enough thereby has the distinction of presenting the first books to the new Library and to the new collection. A further Heritage gift of the handsome Shakespeare Head edition of the works of Edmund Spenser was made by the Friends of the Library.

It is debatable whether the passing of the 400,000 volume mark by the Library is a matter for congratulation or condolence. Though many of the greatest libraries are very large, not all great libraries are large nor are all large libraries great. Mere size is rapidly ceasing to be an appropriate yardstick to measure the quality or worth of a library. Duplication of little used material by a number of libraries in a region is costly and unnecessary; indeed it is indefensible if, by this process, other important material does not reach the region at all. The recent report of Harvard University on the cost to that institution of supporting its great collections in the style to which they are accustomed and the high proportion of that cost which can properly be regarded as in the service of scholarship outside the university is revealing. The Institute Library faces no such sharp crises as the libraries of some other institutions, and we have significant lacunae so that for some years we should plan on growth at least of the current order. But the day is

nonetheless approaching when we shall reach the upper limit of utility and the maximum proper ratio of annual library cost to other costs in the institution. Before that day arrives, it is to be hoped that a practicable and complete form of inter-library cooperation will have been worked out for the Boston region.

National and International Relations. The Institute Library has taken a positive stand of participating and cooperating in major national and international library programs, even though we have often disagreed with some of the details of the plans. The following may be mentioned:

(*a*) We have participated fully to the extent of our means in the implementation of the Farmington Plan, although we believe the presently proposed method of allocating material is less than ideal.

(*b*) We have cooperated wholeheartedly in the Cooperative Acquisitions Project, even though we are convinced that the priority allocations were ill-advised and, in our case at any rate, unfair.

(*c*) The Director of Libraries, serving as consultant to the United Nations, has written a program for the New York library of that body comparable to, though less extensive than, the program he prepared for our own library building.

(*d*) The Director of Libraries has been chairman of the publications committee of the Cooperative Committee on Library Building Plans, which is preparing a monograph on university library buildings under a grant from the Rockefeller Foundation, of which fund the Institute is trustee.

(*e*) James W. Perry, Library Fellow in Chemistry, has served as chairman of the punched-card committee of the American Chemical Society, which has made notable strides in the study of the applications of rapid selector methods to chemical literature.

(*f*) Staff members have participated fully in local, regional, and national library meetings and in particular we have been continuously and authoritatively represented at meetings of societies dealing with problems of greatest urgency at M. I. T., including the Association of Research Libraries, the Association of College and Reference Libraries, and the American Library

Association. The Librarian-Designee, Vernon D. Tate, is chairman of the important ARL committee on microfilm cooperation and as American editor for the international *Review of Documentation* is taking a significant part in the work of the International Federation for Documentation. The Vail Librarian, Mrs. Ruth McG. Lane, continued as special representative for the Special Libraries Association on the American Standards Association's Committee Z-39 and as chairman of the engineering school libraries committee of the American Society for Engineering Education. The Eastman librarian, Marguerite Chamberlain, is a member of the executive board of the Boston chapter of the Special Libraries Association, and Margaret P. Hazen was in charge of the national exhibition of that society at the annual meeting of the American Association for the Advancement of Science in Boston in December.

Branch Libraries. The general difficulties of the cataloguing department are perennial in any library report and will not be dwelt upon here. It should be noted, however, that our branch system imposes heavy additional loads on our catalogue department through constantly recurring transfers of material between the various branches and the Central Library and among the branches themselves. This year 1,300 volumes were so handled, amounting to 21 per cent of the newly acquired volumes which were catalogued. They are the inevitable price for a branch system; nonetheless the merits of our branch library system are increasingly clear and, therefore, this price must be cheerfully paid.

The principal changes in the branch system this year involved the transfer of the Rotch Library from the administration of the School of Architecture and Planning to that of the Library; the move of the Aeronautics branch library to more commodious quarters, which still give no promise of permanence, for no expansion is possible in the new location and the field is an infant one in which library resources can be expected to grow at an accelerated rate; the transfer of the Meteorology collections to the Central Library when the Department of Meteorology moved to new quarters.

The branch system accounted for nearly 70 per cent of the total circulation, the remaining 30 per cent coming from Cen-

tral. Of 107,000 volumes circulated from the branches, 66,000 came from the scientific and engineering collections and 41,000 from the Walker Memorial. That the latter collection, covering English, history, music, and recreational reading, should account for over 25 per cent of all the Institute's library circulation is a matter for gratification to those who are concerned with the humanistic aspects of Institute life.

Various branches, of course, report various difficulties. Lighting is deemed inadequate in the Walker, Dewey, Eastman, and Lindgren libraries. Shelf space is more than inadequate in the Vail and Lindgren. The Lindgren Library simply cannot house the spate of maps now being received at the rate of 16,000 in one year, and the whole collection needs special and systematic attention. Seating capacity has been taxed to the limit almost everywhere, but especially in Dewey, Eastman, and Central. The record player in Walker Memorial operates twelve hours a day; even so, many would-be listeners must be turned away.

Of more serious general concern is the premium placed on library seating by the deficiency of general study halls in the Institute itself. Any librarian worthy of his salt welcomes readers, even though they do not come primarily to use his wares. But there is a problem of balance. The Eastman Library, for example, is primarily designed for advanced students in Mathematics, Physics, and Chemistry, and should, of course, serve advanced students of engineering who need to consult its materials. But it chances also to be conveniently located for general study. It is not a happy situation when a scholar for whom the reading room is designed cannot obtain a seat because general study is being pursued at several desks. We are off balance on this score but hesitate to initiate rules which will discourage anyone from using any reading room at the Institute.

If it were not for the hope with which we look to the early construction of the Hayden Library, many of these situations would be intolerable and call for immediate action. As matters stand, prudence indicates deferment of refurbishing and rearranging, needed in almost every branch, until the new Hayden Library eliminates some problems, diminishes others, and

doubtless creates a few new ones. Since these improvements cannot long be postponed without serious harm to the utility of our libraries, it becomes increasingly imperative that the Hayden Library be completed and occupied at the earliest possible date.

The Hayden Library. Construction of the new Hayden Library was deferred in view of the mounting costs of building, which always have managed to keep pace with economies that have been repeatedly introduced into the original plan. As it became apparent that the gap was widening between the estimated costs and the money available, it was decided to investigate whether a new approach to the building design itself, plus the elimination of a few clearly side activities, might not result in a building which could be built now (as it is so badly needed) and with no crippling change either in the major elements of the program or in the scale at which they were to be developed. An important change involves retention of the present Central Library as part of the total library system, devoting it at the outset, anyway, to the service of the branch libraries in Electrical Engineering (Vail) and in Biology and using the upper stacks as transitional storage for little used material between the time it is removed from the new Hayden Library and consigned to the New England Deposit Library, which we continue to use.

Administration. The year has witnessed the customary meetings of the various committees associated with the Library. The Visiting Committee held an unusually extended and provocative session and has rendered a long and thorough report calling for substantial expansion in some fields and indicating the nature of the contribution which the Library should render to world scholarship. The greatest emphasis is laid upon the full exploitation of technological tools, such as microreproduction, visual and aural aids, and rapid selectors, a program which calls for both basic research and pilot-plant types of study.

Probably the major administrative problem now confronting us and indeed all libraries is that of securing high-grade new personnel. There is a very grave shortage of trained librarians in the United States, and the output of library schools gives no promise of stretching to meet the demand.

The shortage is particularly acute in the fields of science and technology, from which few are induced to librarianship. Granting that a general education is quite as necessary as a specific one for the highest performance of the duties of a librarian, the fact remains that a library like that of the Institute can do only a limited amount of in-service training for those who have not attended library school. All that need be said here is that we are in a seller's market which is likely to endure for years; this inevitably has serious repercussions, both on the total library budget and on the portion of the budget which can be allocated for nonpersonnel purposes.

Another thorny problem, possibly more acute at M. I. T. than elsewhere, is that of the classified paper. Security still lays its heavy hand on the free exchange of knowledge. We have at M. I. T. two document rooms independent of the library administration, restricted in clientele, subject to no necessary coordination in policies as to salary, duties, and methods. That waste and duplication must ensue is obvious. But these are trivial when compared with other major considerations, such as the insidious effects of developing groups who have to be given preferential treatment, or of knowledge in a library which is not available to all. The problems raised by restrictive librarianship are precisely those raised by restrictive scholarship and we speak here of but one symptom of the bad effect of classified work on the university as a whole. Classified libraries must be kept to a minimum.

The most important administrative events of the year were, of course, the arrival of Dr. Tate and the retirement at the year's end of William N. Seaver, Librarian, and Bertha P. Trull, Assistant Librarian. Mr. Seaver became Librarian at M. I. T. in 1925 and Miss Trull joined our staff in 1908. Under Mr. Seaver's administration, the collections increased from about 200,000 to over 400,000 volumes; the famous Jackson report was made and the subsequent branch library policy established; the Institute Library changed from a parochial institution to a national one. These are major accomplishments warranting more than this note, and they will be treated at greater length in the expanded report. Loyal and efficient administrators like Mr. Seaver and Miss Trull do not appear

every day, and the affection felt for them by their staff, both those now in residence and those now far away, has been made more than evident. We bid them farewell with a regret which is tempered with admiration for their long and useful service; at the same time we look with enthusiasm and expectation to the coming regime of Dr. Tate.

The Museum

Museum activity has followed the pattern of the previous year, with emphasis on temporary shows selected primarily for their potential interest to students and staff. Twenty-one exhibits were presented, as compared with twelve in the previous year. Their quality remained nonuniform, due to the difficulty in many cases of appraising exhibitions from the prospectuses. Nonetheless as the program becomes more widely known to the creators of exhibitions, we are sought out more often and it is becoming possible to be increasingly selective. Sources such as the Museum of Modern Art in New York, the Institute of Modern Art in Boston, the American Federation of Arts, and the Encyclopaedia Britannica assure schedulings of their best material.

Five of the twenty-one showings were originated at the Institute. The Museum Committee exercised general supervision over three of these shows, but did not create them. The remaining two, on the other hand, were major efforts of the Museum Committee. One in February was prepared at the request of the administration in order to inform freshmen as to the opportunities in the less crowded courses. The second was prepared for Alumni Day in June and showed the growth of the Institute in terms of people, buildings, money, and programs from 1865 to 1947. This will be repeated at the beginning of the fall term, 1947.

Problems confronting the Museum Committee include the finding of still better shows from outside, a way of protecting extremely valuable objects while showing so that we can dare to exhibit them, the refurbishing of the Hart Nautical Museum following the return of space borrowed from it for war purposes, the securing of an appropriate space for storage and work preparatory to an exhibition, the enlisting of still further

cooperation from departments to the end that even more stimulating shows can be created with local materials. The policy of the temporary exhibition, instituted in full force a year ago, appears to have been amply justified and to warrant intensification, especially as to quality; policy as to a long-range program for the creation of significant permanent exhibitions remains unsettled. This is probably the major question to which attention should be given in the forthcoming year.

JOHN E. BURCHARD

DIRECTOR OF THE DIVISION OF INDUSTRIAL COÖPERATION

Total research volume decreased from $24,259,000 in 1946 to $9,825,000 in 1947. Included in this 1947 figure is over $1,000,000 of liquidation and settlement expense connected with the Radiation Laboratory, so that our active research figure might be better taken as approximately $8,700,000 for the year.

The character of projects under "General Government" has changed little during the year. There was an increase of $1,750,000 in materials and services purchased off the premises. This is indicative of a significant advance in the obtaining of highly specialized equipment necessary to the types of research that are going on. This figure is expected to be materially increased in 1947–1948 because of the Supersonic Wind Tunnel (a negligible factor during the past year) and the completion of certain large research tools that are still in the process of development.

The relationship of academic staff to full-time Division staff is 20 academic to 26 Division. During the year, 305 graduate students were employed part time on D.I.C. projects.

Fiscal Report for the Year Ending June 30, 1947

Dollar Volume	*Fiscal Years* 1946-1947	1945–1946
Office of Scientific Research and Development (Radiation Laboratory)	$1,157,000	$19,914,000
General Government	8,075,000	3,649,800
Industrial	593,000	695,200
	$9,825,000	$24,259,000

Fiscal Report (Continued)

Active Projects	*Number in July, 1946*	*Additions*	*Expirations*	*Number on June 30, 1947*
General Government	81	47	21	107
Industrial	43	21	18	46
Total	124	68	39	153

Personnel	*As of June 30, 1946*	*As of June 30, 1947*
O.S.R.D. (Radiation)		
Staff	58	——
Nonstaff	232	——
Projects other than O.S.R.D.		
Staff	379	473
Nonstaff	436	631
M. I. T. Staff	220	351
	1,325	1,455

N. McL. SAGE

ADVISER TO FOREIGN STUDENTS

In September, 1947, approximately three hundred foreign students were registered at the Institute. This makes the foreign representation between 5 and 6 per cent of the total registration, a proportion which has been fairly steady during the peacetime years of this century. These three hundred students are registered for both undergraduate and graduate degrees in all Courses at the Institute except the few which are restricted to United States service personnel.

An important development of the postwar years has been the increase in government-sponsored programs. The most ambitious of these has been that of the government of India, which is sending each year to this country over two hundred students. These are all postgraduate students, many of them candidates for the doctor's degree. Their complete expenses, for tuition and subsistence, are met by the Indian Government. The applicants are chosen on the basis of country-wide competition; they are chosen for study in fields in which the government expects to need trained men; and on their return they are

obligated to work in government service. These students are widely scattered among the leading universities in this country; the Institute at present has seven of them registered in the Graduate School.

Many other governments besides that of India have similar programs, and many requests are received to admit rather large groups each fall. No groups are admitted as such, but each individual applicant must submit his record and be judged for admission along with those who are backed by foundations, industrial firms, and foreign universities, and those who come on their own resources. In this way a superior group of foreign students is secured, having excellent qualifications, both academic and personal, and comprising an interesting cross section of the world's young men and women.

The following table shows the number of inquiries received from abroad concerning the possibility of admission to the Institute in September, 1947. Of the 636 completed applications, 366 were for admission to undergraduate Courses, and 270 were for admission to the Graduate School. Of the 144 admissions granted, 80 were to undergraduate Courses at various levels, and 64 were admissions to the Graduate School. The three leading Courses to admit graduate students in September, 1947, were Mechanical Engineering, Chemical Engineering, and Metallurgy.

Foreign Students Applying for September, 1947
(Inquiries Received from May 1, 1946, to May 1, 1947)

	Inquiries Received and Applications Sent	*Applications Completed*	*Admitted for September, 1947*
Latin America	474	93	16
British Commonwealth	188	38	13
Northern Europe	115	39	16
Western Europe	183	52	22
Central and Southern Europe	144	40	11
Near East	436	130	34
India	435	122	18
China	387	113	23
Other Far East	57	9	1
Total	2,419	636	144

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.

Alumni Placement. During the fiscal year 1946–1947, the demand for men fell off by 8 per cent, and the number of men desiring to change positions dropped 14 per cent under the previous year's figures. Although we have not made a statistical analysis, it seems likely that the 8 per cent drop in jobs resulted from a lack of openings in Civil Service and that the demand from industry held steady or even increased. Since manpower dropped off considerably more than demand, the need for well-trained men actually went up at least 6 per cent during the past fiscal year.

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

Percentages Changes in 1946–1947

8% fewer jobs
14+% fewer men
19% more placements

	July, 1946–June, 1947	*July, 1945–June, 1946*
Number of Jobs	2,594	2,831
Men Who Went on Available List	1,309	1,527
Men Who Came off Available List	1,082	830
Placements	246	207

Probably the greatest changes we have noticed are that the openings we now hear about are more accurately defined than they were during the war years, and that companies are becoming increasingly discriminating in their choice of employees.

By the end of November, 1946, it was unusual to have a man in uniform come into the office, and the average age of men seeking positions had risen sharply. Practically none of the men who registered with us during the year had been unemployed, and very few of them were on the available list because they were discontented with the type of work they were doing. A majority of men looking for new positions are trying to better

themselves financially or trying to locate in a town where housing is available.

We have been happy to notice that our young veterans seem to be making an excellent adjustment to their postwar jobs. A few of them have been forced back onto our available list because they accepted positions in the aircraft industry and were discharged in the spring of 1947 when a good many government contracts with the aircraft industry were canceled. Aside from that, we have had few "repeaters" among the young men who were seeking positions last year when they were released by the Army or Navy. It seems likely that being married when they accepted their first civilian work has had a great deal to do with the fact that they have stuck so closely to their jobs. In spite of the fact that they are earning more than they could have hoped to earn in comparable positions before the war, they are finding it very difficult to make ends meet and can't afford to be restless once they are settled and have located a place to live.

At no time during the past fiscal year was there any feeling in this office that the much heralded recession was on its way. It will probably be felt through the attitude of men seeking jobs long before the actual number of jobs listed with us begins to fall off sharply. When men begin to write or say that they don't care where the position is so long as it is with a good company or when the demands for "security" again become frequent, we will begin to worry about a business recession. The war was almost over before men stopped job hunting in terms of security. It is a word we seldom hear now. It has been replaced by "good location," "interesting job," and "opportunity to accept responsibility."

Student Placement. From June, 1946, through June, 1947, a total of 237 companies came to the Institute to conduct personal interviews; 470 companies asked to have interested and qualified students get in touch with them directly.

Students from Mechanical Engineering, Chemical Engineering, Electrical Engineering, and Business and Engineering Administration were still in largest demand. Most of the companies raised their starting salaries about $25 a month over their 1946 rates. More companies are interested in graduates

with advanced degrees than ever before in the experience of our Placement Bureau.

In spite of every effort on the part of the undergraduate placement office and the registration officers, we were not successful in getting a report on the status of each member of the graduating class. For this reason the placement statistics are probably a good deal lower than the actual figures of graduates placed.

June, 1947, Class

	Individuals	*Those Reported Placed*	*Per Cent*
Bachelors	478	314	65.5
Masters	232	132	56.5
Doctors	33	26	78.8
Total	743	472	63.2

N. McL. SAGE

PERSONNEL OFFICER

During the past five years, labor unions have organized the nonprofessional employees in many of the large universities throughout the country; they have been particularly successful with the maintenance employees. In the summer of 1946 two unions opened aggressive campaigns to organize the laboratory service and maintenance employees at the Institute. An election was held by the Massachusetts Labor Relations Commission which resulted in the certification of the A.F. of L. Building Service Employees' International Union, local No. 254, as bargaining agent for the maintenance employees and of the M. I. T. Employees' Union (independent) for the laboratory service employees. Contracts were signed with both unions by early November. The Institute's relations with the unions have been good, with very few grievances being pressed and a number of helpful suggestions coming from union representatives.

At the request of the M. I. T. Employees' Union, the Institute agreed to classify all laboratory service employees (approximately six hundred), review their rates, and compare

their rates with those of other organizations in the area. This study was carried out by a committee of ten staff members and foremen from different departments and projects. Although there were a number of grievances when the classifications and rates were announced, all but five were settled in the first stage of the grievance procedure.

In addition to merit increases and adjustments of rates to maintain greater uniformity between departments, all laboratory service and maintenance employees received a 15 cent increase in pay effective July 1, 1946, and office employees received a 10 per cent increase. In May, 1947, the work week for office employees was reduced from five and a half days to five days.

Aside from wage increases, the Institute has taken several steps to formalize and improve personnel procedures:

(1) In layoffs and promotions of laboratory service employees, the Institute has agreed in the union contract to recognize the principle of over-all seniority when qualifications such as ability, training, skill, and other relevant qualities are considered equal by the Institute. Where there is a fluctuation in the personnel requirements of the various research projects, this policy, combined with the administration's efforts to place employees who are to be laid off, has helped to increase the job security. Although over thirty positions were eliminated during the year, all the incumbents were offered other positions.

(2) A formalized sick-leave policy has been developed for all office, laboratory service, and maintenance employees.

(3) Before an applicant is hired to fill a laboratory service vacancy, current employees wanting the position are now given first consideration. A description of the vacancy is posted on the bulletin board and employees have three days in which to apply. Although the number of transfers which have resulted from this procedure is small, many employees have expressed approval of it.

In the fall of 1946 Ruth C. Glynn resigned as personnel officer at the time of her marriage. R. Colin Maclaurin was appointed personnel officer on October 15, 1946, and Mrs. Francis Bowell became assistant personnel officer in December, taking over the employment functions of the Personnel Office.

Although there has been a shortage of office personnel in the area, competent candidates have been found for the vacancies which have occurred.

As of June 30, 1947, there were 1,679 nonstaff employees on the pay roll, of which number 631 were charged to the Division of Industrial Coöperation.

R. COLIN MACLAURIN

MEDICAL DIRECTOR

During the year there were numerous changes in the personnel of the Medical Department. Dr. George W. Morse retired on January 31, 1947, after twenty-six years as medical director. Under his supervision the Medical Department made remarkable strides forward, and he left it in a thoroughly sound condition. Helen Louise Delano retired as matron of the Infirmary on June 30, 1947, after seventeen years of service. Many members of the Institute staff and student body remember with gratitude the always kind, considerate, and gracious treatment which they received in the Infirmary while it was under her guidance. Dr. John J. Gibbons retired as director of Dental Service after several years of devoted and efficient service. Dr. Benjamin E. Sibley, who had stayed beyond the normal retirement age because of the urgency of war conditions, likewise retired on June 30, 1947. To all these the Medical Department owes much. Dr. Harold A. Carnes has been selected as the new director of Dental Service. Mrs. Elizabeth M.Ward has been appointed acting chief nurse in the Infirmary. Dr. John W. Chamberlain, Assistant Medical Director and Surgeon, has agreed to give half time to the Institute.

Several changes have also been made in the internal organization of the Department. The William R. Kales Clinic has been expanded to include treatment of the ear, nose, and throat, and Dr. Lyman G. Richards has been appointed otolaryngologist. A clinic for treatment of skin disorders was set up during the year, with Dr. G. Marshall Crawford as dermatologist.

There was a substantial increase in the number of visits to the general medical clinic as compared to the previous year. There were 33,690 clinic visits for illness, 4,514 for X-rays, and

5,284 for physical examinations, making a total of 43,488. Of the clinic visits, 73 per cent were made by students and 27 per cent by staff members and employees. During the year 230 minor surgical operations were performed in the clinic, although, as usual, major operative procedures are carried out in Boston and Cambridge hospitals.

The number of statements to the Dean's Office for absences due to illness was somewhat smaller than last year and represented 4,585 days lost from classes. It is realized that this probably does not represent the total amount lost by illness, but it is a fairly good index of the state of health of the student body. Although this number seems large, it represents an average of less than one day's absence for each student enrolled in the Institute.

The total number of patients treated in the Infirmary was 731. The average stay for each patient was about five days, making a total of 3,517 patient days. Of this number of patient days, 74 per cent were accounted for by students and the other 26 per cent by staff members and employees. The average infirmary census during the nine months of the regular academic year was 11.8, while during the three summer months the average census dropped to 3.5 daily.

The greatest load borne by the Infirmary came during March and April when we had a mild epidemic of respiratory infections. During those two months the average census in the Infirmary was 18.6. At no time during the year were we unable to meet the demands for beds in the Infirmary, although on one occasion for several days all beds but one were occupied. There were two deaths in the Infirmary during the year, one in the staff group and one in the employee group. Three student fatalities occurred, but all were outside the Infirmary.

During the past year a permanent nursing staff has been organized in the Infirmary, and all nurses have been placed on an eight-hour day. The staff now consists of nine nurses, and this permits adequate coverage of the Infirmary at all times.

Special Clinics

William R. Kales Clinic. One of the most pleasing developments during the year was the rapid expansion of the functions

of the William R. Kales Clinic. There were a total of 791 consultations by ophthalmologists. In January, 1947, the scope of the clinic was increased to include disorders of the ear, nose, and throat, and from that time until June 30 there were 439 consultations by the otolaryngologist.

Psychiatric Clinic. The work of the Psychiatric Clinic also increased sharply, there having been 737 consultations during the year. This increase does not represent a change in the stability of the student body but rather increased efforts to meet the emotional needs of the students. According to the experiences in other institutions, this number is considerably lower than if complete coverage of emotional problems were obtained. It is our opinion that the level of the psychiatric care should be kept as high as possible and that future expansion be accomplished conservatively. In addition to his regular professional training, the college psychiatrist must have special experience in the academic setting. Physicians with such training are fewer than is desirable. When suitably trained psychiatrists become available, this clinic will probably undergo still further increase in size.

Dermatology Clinic. The Dermatology Clinic has been in existence only four months but has proved to be quite successful. Dr. G. Marshall Crawford, the dermatologist, had a total of eighty-five consultations from February 28 to June 30, 1947.

We were again fortunate in having a relatively small number of contagious diseases, twenty-five in all. These included eleven cases of measles, ten of chicken pox, two of German measles, and two of mumps. As in the past, these cases were transferred immediately after diagnosis to the Haynes Memorial Hospital in Brighton.

Dental Service

The work of the Dental Service continues to be of outstanding value to the Medical Department. More than 5,000 visits were made for examination, treatment, prophylaxis, or X-rays. This indicates quite clearly the large volume of work accomplished. The Dental Service in its health program emphasizes diagnosis and prevention of dental disease and

refers students to private dentists for special mechanical or surgical procedures.

Laboratory Service

There has been much difficulty in past years in securing medical technicians who are trained to perform the great variety of laboratory tests that are needed if the medical service is to be profitably utilized. We were fortunate this year in securing the services of I. R. Geltman, '34, who, with his staff, operates a commercial laboratory and in addition does all our laboratory work.

The Department purchased an electrocardiogram during the year.

Preventive Medicine

Increasing emphasis is being placed by the Medical Department on preventive health measures. During April, 1947, the State Department of Health in cooperation with the Medical Department brought to the Institute its mobile chest X-ray equipment, and 4,100 persons were examined. Information was gained during the survey which justified the establishment of a plan of annual chest X-ray examinations for all Institute personnel. Accordingly arrangements were made and equipment secured to inaugurate such an annual examination beginning in October, 1947. Likewise each new employee will have a chest X-ray as a part of his original physical examination.

Each entering student is now required to have been immunized against typhoid fever and smallpox prior to matriculation. All students, particularly those who participate in athletics or who have allergic tendencies, are urged to be immunized against tetanus with tetanus toxoid, both because of its effectiveness and because of the absence of serious reactions as compared to tetanus antitoxin. In December, 1946, influenza vaccine was offered to all who desired it, and over 1,100 injections were given. Upon entering employment all food handlers are given a thorough examination, including X-ray of the chest and a Wassermann test, and after employment an annual examination is conducted. In addition close cooperation is maintained with Professor Murray P. Horwood, who is in charge of maintaining sanitary conditions in the dining rooms.

The Department has continued its close cooperation with other divisions of the Institute and has been helped particularly by numerous personal consultations with faculty members concerning medical aspects of students' problems. This strong personal interest shown by faculty members has frequently aided the physicians of the Department in getting at medical problems much earlier than would otherwise have been possible. A physician has been present at all regularly scheduled athletic competitions. Regular and frequent medical inspections are conducted on all employees working under potentially hazardous conditions.

DANA L. FARNSWORTH, M.D.

SCHOOL OF ENGINEERING

Aeronautical Engineering

In the report for 1945–1946, mention was made of increased enrollment and plans for corresponding increases in staff and facilities as well as the necessity for the introduction of advanced subjects of instruction. These plans were carried out during the past year.

Space available to the Department's teaching activities was substantially doubled by the vacation of the fourth floor of Building 33 by the Department of Meteorology and by the moving of all classified work on fire control to the Hood and Whittemore buildings. In addition, the Aero-Elastic Laboratory was assigned temporary Buildings 19 and 23. Building 33 has now been remodeled to provide a drafting room for one hundred students, five classrooms, and a seminar room, increased office space, as well as adequate laboratory space for unclassified work in instrumentation, aero-elasticity, and structures.

The usual prewar total enrollment was 150. This year it reached a total of 425. Next year it is expected that we shall stabilize at the authorized quota of sixty in each undergraduate class and seventy-five graduate students. The staff has been nearly doubled during the past two years, and the new men have now had sufficient time to work into the teaching program.

New subjects of instruction were offered as follows: Aerodynamics of Compressible Fluids by Professor Hsue-Shen Tsien, Aerodynamics of Nonviscous Fluids by Professor Manfred Rauscher, Aerodynamics of Viscous Fluids by Professor Joseph Bicknell, Automatic Control of Aircraft by Professor Otto C. Koppen, Power Plant Performance and Installation by Professor Edward S. Taylor, Advanced Aircraft Structures by Professor Joseph S. Newell, Fire Control and Advanced Fire Control by Professor C. Stark Draper, Advanced Fire Control Laboratory by Professor William R. Weems, Automatic Control Equipment by Professor Robert C. Seamans, Jr., Rotating Wing Aircraft by Professor René H. Miller, Jet Propulsion Engines by Professors Edward S. Taylor and William R. Hawthorne, Aero-Elasticity by Professor Manfred Rauscher, Aero-

Elasticity Laboratory by Professor Rodney H. Smith, and Dynamics of Structures by Professor Raymond L. Bisplinghoff.

The above-listed subjects were available to graduate students but some were given a B rating to permit election by well-qualified seniors. Otherwise, no changes were made in the undergraduate curriculum.

Instrumentation Division. Enrollment of graduate students from various Departments for instrumentation work was eighty, including thirty student officers taking a special program in fire control.

With the removal of all classified work from Building 33, the space vacated was equipped as a general instrumentation laboratory under the supervision of Professor Walter McKay.

The classified work moved out was arranged on two floors of the Hood Building and three floors of the Whittemore Building. Excellent facilities for research and model-shop construction were provided. Under Professor C. Stark Draper's supervision, nine research contracts were undertaken for the Bureau of Ordnance of the Navy and the Armament Laboratory of the Army Air Forces. The working force was 168, including six staff members. In addition, some fifty-two engineers and draftsmen of the firm of Jackson and Moreland were engaged on a temporary basis. The work for the most part was concerned with research and the application of its results to the development of fire-control and gyroscope equipment. Current developments were used as examples in instruction of Army and Navy officers. A special classroom was provided for this in the Hood Building, where security requirements could be conveniently fulfilled.

One research project may be cited as an example. The objective was to improve air-borne sighting equipment for use against moving targets. The program involved radar, computer, flight instruments, servopilot, controls, and the performance of the airplane. Nineteen students worked on elements of the problem during the year as part of their thesis research. Seventeen were student officers and two were civilian doctor's candidates.

Flight testing was conducted at Bedford Airport on airplanes furnished by the government.

Wright Brothers Wind Tunnel. This wind tunnel has been operated exclusively on aerodynamic analyses of new airplane designs for industrial clients, with the exception of the tunnel time reserved for student instruction. The trend of the work is turning to design problems associated with landing, take-off, and launching characteristics. Beginning this year, students in subject 16.62 (Aerodynamic Laboratory) performed one laboratory exercise in the large tunnel as part of their required program. The wind tunnel staff, under the supervision of Professors Shatswell Ober and Joseph Bicknell, consisted of eight test engineers and five helpers.

Student's Wind Tunnel. This Venturi-type tunnel, built in 1928, has a five-foot experimental section and is equipped with an aerodynamic balance no longer representative of good practice. This type of tunnel is also uneconomical in power consumption and utilization of space. During the year a modern closed-return tunnel with a 4 by 6.5 foot experimental section was designed by the staff of the Wright Brothers tunnel, making use of the Ward-Leonard electrical equipment and the space occupied by the old tunnel. The new tunnel will have equipment of the character of a modern industrial tunnel, including a six-component aerodynamic balance, special apparatus for testing powered models, and auxiliary instrumentation of precision. Construction should be completed by the opening of the 1947 fall term.

Sloan Laboratory and Gas Turbine Laboratory. These laboratories are jointly staffed by the Departments of Mechanical Engineering and Aeronautical Engineering and jointly operated. Accounts describing their development are given in the report for the former Department and need not be repeated here.

Project Meteor and Supersonic Laboratory. This comprehensive project for the Bureau of Ordnance of the Navy Department, involving several Institute Departments, is served by an aerodynamics group in this Department under the direction of Professor John R. Markham, who increased his staff at the end of the year to fifteen by the addition of ten of our June graduates — six Bachelors and four Masters of Science in Aeronautical Engineering. The group has been occupied with

analytical studies of subsonic and supersonic flow involved in the design of guided missiles.

In addition, toward the end of the year, the group was assigned responsibility for the design of a Supersonic Wind Tunnel and a six-component aerodynamic balance, together with optical and other special instrumentation necessary for model research in missiles and elements of their control. The tunnel will consist of a closed-return channel through which dried air will be circulated by two centrifugal compressors. With a power input of 10,000 horsepower, the air velocity in the throat can vary between 1.2 and 4 times the velocity of sound, and there also will be provision for varying the density of the air to permit testing over a wide range of Reynolds numbers. The throat where models will be mounted has a cross section of three square feet. The general design is based on that of a similar installation at the Ames Laboratory of the National Advisory Committee for Aeronautics, which was made available to us. The firm of Jackson and Moreland are engineers and architects for the Institute, which is constructing the facility for the Bureau of Ordnance on Memorial Drive at the west end of the Institute's land.

On June 14, 1947, ground was broken on the site by Vice Admiral George F. Hussey, Jr., Chief of the Bureau of Ordnance. Present at the ceremony were Rear Admiral Daniel V. Gallery, Deputy Chief of Naval Operations for Special Weapons and Guided Missiles, Rear Admiral Alfred M. Pride, Chief of the Bureau of Aeronautics, President Karl T. Compton, and members of the faculty. The building schedule indicates completion in eighteen months.

Structures. The increased speed of aircraft made possible by recent advances in power plants, notably from jet propulsion, has raised serious structural problems due to dynamic effects. Furthermore, higher speeds mean thinner wings and an increased hazard of the catastrophic vibration called "flutter." It is no longer safe to rely on static calculations. The position is such that it is necessary to revise our basic treatment of structural design to take account of these new requirements.

With the increases in staff and space authorized last year,

steps were taken to establish laboratory facilities for research in structural dynamics and in aero-elasticity, together with corresponding new subjects of instruction in the Graduate School. The Structures Laboratory in the basement of Building 33 has been re-equipped for dynamic testing, including shaking and twisting equipment, a drop test apparatus, and extensive electrical strain gauge and oscillograph instrumentation. For flutter work, a model shop has been set up in the adjacent temporary Building 23, and the facilities of the flutter wind tunnel have been considerably extended.

The structures group undertook a research program, sponsored by the Navy, to determine mode shapes and natural frequencies of wings with characteristics of interest in current designs, and an investigation of transient vibrations in typical structures. Professors Walter H. Gale and Raymond L. Bisplinghoff supervised this work with a staff of six engineers.

The Flutter Laboratory has undertaken theoretical studies of the mode shapes of wings during flutter, the aim being to determine the distorting influence of the air forces on the still-air vibration modes. Also under way is a supplementary study of the forces on a wing at subcritical air speeds and of the manner in which vibration develops into self-sustained flutter as the critical speed is approached. Both of these projects have been sponsored by the Navy.

The model techniques developed by the Flutter Laboratory have been used in experimental studies of the effects of concentrated solid and liquid masses on the flutter of a typical wing. A systematic study of the influence of sweepback has been carried well along. Valuable additions to previous data have also been obtained with the airfoil oscillator built and operated by the laboratory for the National Advisory Committee for Aeronautics.

The opportunity has been taken to provide comprehensive experimental facilities both for student instruction and for thesis research in this new field. Professor Manfred Rauscher has supervised the Department's program on flutter, with Professor Rodney H. Smith in charge of the new laboratory. It is believed that the Department now has facilities and per-

sonnel which give it a unique position in the field of structural dynamics and aero-elasticity.

Cooperative Research. Not counting the Sloan Laboratory and the Wright Brothers Wind Tunnel, the Department has undertaken in connection with the Division of Industrial Coöperation some twenty-seven research projects of professional interest. The sponsors were: Army Air Forces (five), Navy Ordnance (six), Navy Aeronautics (eight), National Advisory Committee for Aeronautics (two), and industrial firms (six). The projects were supervised by five senior staff members as part of their academic duties. Junior staff members were added to permit such assignments. However, there is always a question of balancing the advantage to teaching of the stimulus of research against the risk of overloading a good man or diverting his enthusiasm from teaching. It is considered that a fair balance was achieved.

Personnel. Professor H. Guyford Stever served as executive officer of Project Meteor and as a consultant to the guided missiles committee of the Joint Research and Development Board in Washington. He also offered a graduate course in heat engineering in the Department of Mechanical Engineering, dealing with kinetic theory of gases.

Professors Edward S. Taylor, Otto C. Koppen, Shatswell Ober, Walter H. Gale, Raymond L. Bisplinghoff and René H. Miller served on technical subcommittees of the National Advisory Committee for Aeronautics. Professors C. Stark Draper and Hsue-Shien Tsien served on the scientific advisory board of the Army Air Forces, and Professor John R. Markham served on its committee on education. Professor Draper also served on the subcommittee on instrumentation of the Joint Army and Navy Research Committee. Professor Joseph S. Newell served on the executive committee of the Column Research Council.

Du Pont Room. On June 14 the Institute dedicated the Du Pont Room, established in the Department as a memorial to Richard Chichester du Pont by members of his family. It is to be used by staff and students for seminars, committee and society meetings, the reception of distinguished visitors, and as a center of extracurricular activities. The memorial room is in

addition to the generous endowment by Mr. du Pont's family of a postdoctorate fellowship in Aeronautical Engineering or Meteorology.

JEROME C. HUNSAKER

BUILDING ENGINEERING AND CONSTRUCTION

The general increase in enrollment throughout the Institute as well as the interest shown by many students from other Departments in the courses offered by this Department has materially increased the sizes of classes in most of the Department's courses. Registration problems caused by transfers and returning veterans continued to make it necessary to repeat many courses in terms for which they were not usually scheduled. The activities of the Department in research continued under various sponsorships. As the staff was not enlarged to any great extent to allow for this heavier load, the individual responsibilities and duties were materially increased. The staff met this challenge loyally, without depreciation in the quality of instruction or service.

The Department has registered graduate students up to its full quota, which was kept at ten in order to assure proper instruction without staff additions. The interest of the graduate students seemed to lie mainly in the direction of structural design and materials.

Masonry Materials. The research on the properties of lime under controlled and variable conditions, under the direction of Professor Howard R. Staley with the assistance of Sidney H. Greenfeld, research associate in the Department, and Donald W. Sabean, Jr., of the D.I.C. staff, has progressed to a point where it now will be possible to specify definite methods to control the quality of the product. This work will be published in the near future.

Plastics. The research program for the Plastics Materials Manufacturers' Association, under the direction of Professor Albert G. H. Dietz, has centered around the development of equipment and a program of tests of the system of plastics based upon polymethyl methacrylate. The design of a universal testing machine was carried to completion and the

machine was put into use. It incorporates an unusual range of crosshead motions and speeds; new, practically inertialess electronic weighing head and recorders offering unusual ranges of loads and rapid switching from one range to another; unique servocontrols not only for rates of crosshead motion but for rates of load and rates of straining as well; grips for carrying tests continuously from tension to compression on the same specimen; and grips for reversed bending studies. Development and construction of equipment have been carried forward on a turbidimeter and viscosimeters for the determination of molecular weights and distributions of molecular weights. A statistical study has been made of the variations to be expected from different methods of manufacture, different cast-sheet thicknesses, and positions across and through the sheet. Strength determinations have been begun on materials of differing average molecular weights and differing plasticizer contents. Exploratory determinations are also under way on materials ranging from hard, brittle laminates to soft, highly distensible elastomers.

Solar Energy. The work on solar energy, started last year, has continued. A solar energy test house was built to carry on exploratory tests of various heat-collecting units during a winter season. In each of seven cubicles are combinations of double glass, aluminum curtains, and metal containers filled with water or salts fusing at 90 degrees Fahrenheit. In two instances heat leaks approximating heat losses from usual house construction have been built into the cubicles; in one instance the glass is triple rather than double. Records of temperatures, solar incidence, and auxiliary heat were kept during the winter season and from these, comparisons are being drawn among the various solar heat storage systems employed.

Copper Roofing. The investigation of gravel stops and flat and standing seam roofing for Revere Copper and Brass, Inc., continued throughout the year under the direction of Professor Walter C. Voss. The actual tests and studies have been made by Albert J. O'Neill, research associate in the Department, with the assistance of Professor Irving H. Cowdrey of the Department of Mechanical Engineering.

Personnel. A second printing of the second edition of *The*

Design of Reinforced Concrete Structures by Dean Peabody, Jr., was made necessary during the year. The manuscript for "Semi-Fireproof Construction" by Howard R. Staley and "Fireproof Construction" by Walter C. Voss is in the hands of the printer for publication in the fall of 1947.

At the forty-fifth annual meeting of the National Lime Association in May, Professor Staley reported on the progress of research under the association's sponsorship and Professor Voss presented a "Commentary on Lime Research." Professor Voss spoke on "Emergency Housing" before the wood industries division of the American Society of Mechanical Engineers at their October meeting in Boston, and delivered the twenty-first Edgar Marburg lecture on "Engineering Laminates" at the fiftieth annual meeting of the American Society for Testing Materials in June. At the Chicago meeting of the Society for Experimental Stress Analysis in May, Professor Dietz presented a paper on "Bonded Wire Strain Gauge Techniques for Polymethyl Methacrylate Plastics," of which he and William H. Campbell were the authors. A paper under the joint authorship of Professor Dietz, G. S. Burr, W. J. Gailus, J. O. Silvey, and S. Yurenka was presented by Professor Dietz at the June meeting of the American Society for Testing Materials. An article on "Shallow Spherical Domes" by Professors Voss, Peabody, Staley, and Dietz was accepted for publication by the American Society of Civil Engineers. Professor Dietz prepared an article on "Structural Timbers," which was published in the January issue of the magazine *Wood*.

The members of the staff have continued their extensive activities in the professional societies. Professor Peabody has been a member of the nominating committee of the Boston Society of Civil Engineers and is now chairman of the three committees of award — for the Desmond Fitzgerald, Designers Section, and Transportation awards. His activities on the building code committee of the American Concrete Institute have continued. Professor Dietz is chairman of the research subcommittee of Committee D-14 on Adhesives, chairman of the tension and compression tests section of Committee D-20 on Plastics, and a member of Committee D-7 on Wood, all of

the American Society for Testing Materials. He is also active as a member of the timber structures committee of the American Society of Civil Engineers. The work of Professors Voss and Staley on committees of the American Society for Testing Materials has continued. Professor Staley has acted as chairman of subcommittee II of Committee C-7. Professor Voss has continued as chairman of Committee C-7, as chairman of subcommittee V of Committee C-12, and as a member of Committee E-6. He is also a member of the administrative committee on research and is the representative of the society on the National Research Council and the Division of Engineering and Industrial Research. Professor Voss has recently been appointed chairman of the building code committee of the American Institute of Architects.

WALTER C. VOSS

BUSINESS AND ENGINEERING ADMINISTRATION

During the past year administrative emphasis was given to the maintenance of the requisite high standards of Institute quality as they applied to the selection of new teaching personnel and the introduction of new teaching methods. Gain in operating efficiency resulted from reductions of irregularities in student programs and from greater familiarity on the part of both students and faculty with new conditions following the war.

Auxiliary Activities. A marked advantage during the year came from the reopening of many New England industrial concerns to students for the purpose of study and analysis. Over 296 different plants were visited by our undergraduate and graduate students. This active relationship with manufacturing companies in the vicinity of Cambridge has necessitated the establishment of a departmental clearinghouse in order to avoid misuse of hospitalities extended to us by neighboring organizations.

Working in close collaboration with the Department is the recently organized M. I. T. Management Association, affiliated with the American Management Association, which has proved a distinct resource in the organizing of informal evening

meetings with executives, student symposiums with professors, and other activities which have enlarged student comprehension of present business conditions and business problems.

Shortages of textbooks and of current teaching material have continued, and the severity of these difficulties shows no immediate sign of lessening. Nevertheless, through various devices, such as the loan of books by upperclassmen, the large entering classes have been satisfactorily supplied. Collection of current teaching material from industry proved taxing upon the energies of the teaching staff, but because of the high flux in economic conditions and manufacturing procedures, this policy is held to be of first importance.

Near the close of the term, all departmental students were advised of the importance of summer employment activities. A procedure was undertaken whereby students were provided with necessary letters of introduction and names of interested potential employers in the vicinity of their homes, who could be interviewed during spring vacation and other periods. In this way, undergraduates established contacts and gained practical industrial experience during the summer interim.

Development in Teaching Procedures. A number of manufacturing organizations were studied by students, who undertook extended investigations of current problems of policy and of plant operation, including discussions with top executives and the formulation of reports. This process of establish ing laboratory conditions within cooperating plants is proving of such merit that activities in this direction will doubtless be increased in future years.

In the resumption of the graduate program, it became necessary to appoint a special committee for the selection of graduate students, in accordance with the quota limitations set for the Department. As in other divisions of the Institute, a large surplus of applications was received. Much credit is due the chairman, Professor Ronald H. Robnett, for the care and attention with which each application was evaluated. As a result, an exceptional group of graduate students has entered the Department and has proved a delight no less than a stimulus to the staff.

In the fall term, as a result of the generosity of Alfred P. Sloan, Jr., it was possible to appoint a series of visiting lecturers, whose coordinated activities enabled the presentation of the graduate subject 15.94, "Contemporary Problems Seminar," dealing with current problems of industrial organization and administration. Visiting lecturers in residence who contributed to this program were: Alvin Brown, Vice President for Finance of the Johns-Manville Corporation; Lounsbury Fish, organization counsel for the Standard Oil Company of California; Reginald E. Gillmor, Vice President of the Sperry Corporation; and Gerard Swope, Honorary President of the General Electric Company. In addition to seminar activities, each visiting lecturer also offered a single formal address to the entire Institute student body. These addresses were later printed and distributed to all seniors and graduate students.

During the spring term, seminars in business administration were resumed for graduate students. Twelve Course XV graduates, presidents of their respective companies, discussed presidential problems and policies built upon their own experience. From these comparative backgrounds, the students have attempted to establish general administrative principles. Departmental graduates contributing to these seminars were: John W. Barriger, 3d, '21, President, Chicago, Indianapolis and Louisville Railway Company; Frederick S. Blackall, Jr., '22, President, Taft-Peirce Manufacturing Company; Richard L. Bowditch, '23, President, C. H. Sprague and Son Company; Harold Bugbee, '20, President, Walter B. Snow and Staff, Inc.; William W. Garth, Jr., '36, President, Lithomat Corporation; Joseph Givner, '22, President, National Merchandising Corporation; Henry C. Haskell, '20, President, Brunswick Woolen Mills; Alan F. Howard, '18, President, Bemis Associates, Inc.; Paul H. Howard, '18, President, Weymouth Art Leather Company; Newman M. Marsilius, '17, President, Producto Machine Company; A. Warren Norton, '21, President, Press Wireless Manufacturing Corporation; and Charles H. Reed, '20, President, Forbes Varnish Company.

This program has been carried forward in preparation for the renewal of the Alfred P. Sloan Sponsored Fellowship Program which, prior to the war, was conducted on a somewhat

similar basis. Data resulting from these preliminary activities are already proving of value in departmental planning with respect to graduate and postindustrial training in business administration.

Among other departmental developments was the initiation of an elective, 15.74, "Advanced Management Laboratory," in which the newer techniques of work simplification are used as a medium for the gaining of facility in modern industrial training methods. This addition to the departmental curriculum reflects the growing importance of training as an executive skill.

Visiting Committee. A Visiting Committee meeting was held in May, and the following topics were considered and discussed: competition for scholars; professional status of departmental graduates; teaching material from large versus medium-sized industries; public relations; opportunities for adult education; departmental alumni relations; departmental research; interim industrial experience during collegiate training; departmental graduate work; instruction in educational techniques; departmental collaboration with the oil industry; interest of technical students in liberal arts; significance of the historical approach. The meeting was in the nature of a preliminary consideration of present and future departmental problems, which will be further reviewed.

Alumni Activities. Early in the year, it became obvious that the increasing rate of change and development in industry materially increased the hazard of obsolescence on the part of industrial managers. It was decided to undertake a survey among the Department's more than 2,000 graduates in an attempt to collect and to compile individual information concerning present-day changes and developments. A questionnaire was issued, eliciting a large number of replies. These were classified into sixty-six subclassifications and formed the basis for eight letters which were issued in sequence to the entire group, under the authorship of different members of the Department. This series brought to the Department an authoritative picture of current changes in industry of especial value to graduate and undergraduate teaching. It becomes increasingly apparent that closer relationships between the

Department and its alumni will prove of mutual value. Further plans for an enlarged activity in this direction are already under way.

Enrollment. At the present time, the Department stands third in point of relative size in undergraduate enrollment at the Institute. In addition, increasing numbers of students specializing in scientific and engineering Courses are taking administrative subjects. Also, Institute graduates of other Departments are enrolling for a fifth year with us in order to attain a bachelor's degree in Business and Engineering Administration.

ERWIN H. SCHELL

CHEMICAL ENGINEERING

Throughout the second postwar year we have stressed high standards of instruction and have limited graduate enrollment to one-third above the prewar average. In graduate work the master's degree has been emphasized rather than the doctorate, consistent with the needs of the older veterans and the pressing demands of industry. The statistics on graduate degrees are pertinent: 78 master's degrees were granted during the year and 15 doctorates, compared with prewar averages of 49 and 12.

Last year's report estimated that undergraduate teaching would become a more important element of staff load as the returning veterans advanced from their freshman and sophomore years to take professional subjects as juniors and seniors. This is now a reality, and for the next two years we shall be handling abnormally large undergraduate classes in the basic Chemical Engineering subjects.

An unusual opportunity for appraising our teaching was offered in the winter by student members of the professional engineering society, Tau Beta Pi. With department approval, a questionnaire dealing with each teacher's effectiveness was filled in by every member of his class and the summarized results were delivered to the teacher in question. The Department Head received only the over-all summary for the staff as a whole, comprising some 650 individual ratings. Each teacher was thus in a position to compare his rating with the

average of the Department and also to evaluate the comments of his students. Chemical Engineering was selected as a test Department for appraisal, and the practice may be extended elsewhere in the Institute. The chance to "see ourselves as others see us" is rare, and the staff is profiting from the frank criticism of its students. In our opinion the results were stimulating, and this type of analysis is a constructive element for improving educational techniques.

The School of Chemical Engineering Practice reopened in July, 1946, and has completed a full year of operation with graduate students. Each of the three stations handled its maximum number of student groups during the twelve months. The Practice School is in a thriving, although somewhat overloaded, condition. Its undergraduate program will be resumed when the abnormal pressure from graduate students relaxes.

The death of Professor Clark S. Robinson in the spring took from us a valued friend and effective teacher who had been a vital force in the Department for the past thirty years.

Two awards of high distinction to Professor Warren K. Lewis were announced during the year: the Priestley Medal of the American Chemical Society for "distinguished services to Chemistry" and the Lamme Award of the American Society for Engineering Education for "his great part in the development of Chemical Engineering . . . and for the vision, inspiration and sound methods imparted to his students through the originality and clarity of his thought and writing and through his personal vigor and enthusiasm."

Several of the staff delivered series of lectures at other institutions during the year: Professor William H. McAdams at Purdue on heat transfer, Professor Ernst A. Hauser in Los Angeles on colloid developments, and Professor Glenn C. Williams at Illinois on jet propulsion. Among the foreign guests to the Department, Terence R. C. Fox of Cambridge University and Dirk R. Zeidler of the Australian Council for Scientific and Industrial Research intensively studied our educational methods and their possible adaptation abroad.

The Fuels Research Laboratory, mainly government sponsored, has further developed its basic studies of high-output combustion. Attention is focused on the principles and

mechanism of initiating and stabilizing flame in high-velocity systems, both in premixed gaseous systems and in those containing atomized liquid fuels. The need for instrumentation to measure turbulence and the general importance of turbulent processes in chemical engineering operations are emphasized by the role of turbulence in combustion and have led to the construction and use of a hot-wire anemometer especially designed for the measurement of extremely fine-scale turbulence. An experimental study of the reactions of oxygen and carbon dioxide with solid carbon is in progress. Unique features of the carbon reaction studies are the use of gas velocities far in excess of those previously attempted in fundamental studies of this type, the care taken to insure controlled aerodynamic conditions of gas flow approaching the test specimens, and the close control achieved over specimen temperature in cold gas streams.

The research on hydrogen peroxide continued through its second year under the sponsorship of the Navy Bureau of Ordnance and with the cooperation of members of the Chemistry Department. The program, involving a staff of about twenty-five, includes investigation of the fundamental properties of hydrogen peroxide and of its aqueous solutions, its stability in storage, the mechanism of catalytic decomposition in liquid and vapor phases, and studies of other peroxide reactions. Recent work established procedures for precise analysis of peroxide solutions; this was followed by careful determinations of the densities of aqueous hydrogen peroxide solutions at all concentrations. Research on the stabilization of concentrated hydrogen peroxide solutions has included quantitative investigations of the effects of appropriate chemicals in inactivating the impurities which are commonly encountered. Studies using radioactive tracers to investigate the mechanism of catalytic decomposition by manganese and lead, made in the previous year, were followed by work on cobalt, silver, copper, osmium, platinum, and mercury in one- and two-component systems. A critical analysis of available thermodynamic data on hydrogen peroxide was prepared, together with recommended values for use. A set of generalized thermodynamic data was developed which is of particular value in

solving problems in high-temperature combustion involving uncommon fuel and oxidant systems.

The development here of a new ultramicroscopic technique which secures ultra-illumination by incident light was reported two years ago. The method has now been extended to study changes in the morphology of lyogels at elevated temperatures. These studies give the first demonstration that the property of elasticity in such systems depends not only upon the shape of the molecule but on the multiphase composition of the substance and on a temperature sufficient to permit oscillation of the dispersed phase of the colloid. Proof for this concept has been offered by synthesis of several elastic plastics from substances like polystyrene, which had not previously been shown to exhibit elasticity.

Further progress has also been achieved in the colloid chemistry of siliceous matter, particularly in the field of soil solidification. The application of certain colloidal properties of high molecular organic compounds to textiles has been initiated.

Progress has been made in study of the various factors which affect adhesion. The threshold conditions under which materials, especially high polymers, can develop adhesive bonds have been established. Parallel conditions for the development of cohesive bonds have been determined. Information is being obtained on the penetration of various liquids into porous surfaces, which is a necessary preliminary to bond formation in such cases.

A number of thesis men are studying heat transfer to water at unusually high rates of heat flow. In preliminary boiling runs the peak densities increased with pressure, from 400,000 B.T.U. per hour per square foot at one atmosphere to 2,100,000 at eighty-two atmospheres. Flow of subcooled water at moderate velocity, parallel to an electrically heated rod, gave local boiling and flux densities as high as 1,800,000. Other investigations dealing with unit operations during the year included the interaction of water and air in a packed tower, yielding individual coefficients of heat transfer for both gas and liquid films; an improvement in methods for designing continuous driers; heat transfer at low pressures; and a study of thermal and barrier diffusion.

There has been marked progress in the experimental study of the behavior of so-called fluidized powders flowing in gas streams. The work has fallen under two heads: the mechanics of flow and chemical reaction rates under flow conditions. In the former field, a technique has been developed for measuring the friction between powder and gas under conditions of rapid powder acceleration. The results indicate a high degree of particle agglomeration in the powders so far investigated and a rapid change in agglomeration under conditions of high friction and turbulence. Exploratory measurements of the rate of flow of heat between masses of fluidized powders and the walls of the containing vessels have revealed complicated flow patterns which were not anticipated, study of which promises to throw important light on the hydromechanics of these systems. Studies of gas distribution in fluidized beds in which a diluent gas is introduced in the middle of the bed have shown that gas mixing tends to be very much less effective than powder mixing. This fact is transforming our ideas of reaction rate mechanisms in fluidized systems. Other studies in the mechanics of flow concerned the fundamentals of mass, heat, and momentum transfer in fluidized catalyst systems. A comprehensive attempt to integrate our knowledge of these factors is under way.

In the study of chemical interactions under fluidized conditions, preliminary work on rate of reaction of both carbon dioxide and steam with different forms of carbon was completed during the year and a more detailed study is continuing. Results already achieved indicate the possibility that in the near future fluidization will revolutionize the manufacture of producer gas and may well turn out to be equally helpful in improving the art of manufacturing water gas. A technique of oxidizing sulphur to both dioxide and trioxide in fluidized beds, using metallic oxides as oxygen carriers, has been explored with promising results.

The prospects for reestablishing a reasonable flow of publications on research and textbooks have improved slightly, but the insistent demands of teaching and research direction and the abnormal size of undergraduate groups will make recovery in this line of activity a slow process.

WALTER G. WHITMAN

Civil and Sanitary Engineering

Among the activities of the Department during the year, a thorough study and major revision of the undergraduate curriculum in Civil Engineering was perhaps the most noteworthy. Based on functional considerations, civil engineering projects involve three phases: conception, design, and construction. The new program is arranged so that in addition to subjects that are basic to all phases of civil engineering, the student may pursue further work adapted to his individual interests by electing, at the middle of the third year, one of the following options:

(1) Theory and Design. This option prepares men for fields such as design, research, and teaching, and for graduate work in either Civil or Sanitary Engineering.

(2) Planning and Administration. Designed to prepare men for the planning of civil engineering projects, including public works, this option serves as a general course in Civil Engineering.

(3) Construction and Management. This option prepares men for supervision of engineering construction of all types and for contracting.

The new curriculum will be in operation for second-year students in the Department in September, 1947.

Whereas the enrollment in the Institute as a whole has increased 108 per cent, based on statistics for successive Novembers, the enrollment in the Department has increased by 125 per cent, as summarized in the following table:

Date	*1st Year Civil*	*2d Year Civil*	*3d Year Civil*	*4th Year Civil*	*Graduate Civil*	*Graduate Sanitary*	*Total Department*
November, 1944...	19	14	14	10	22	3	82
November, 1945...	24	8	15	14	35	3	99
November, 1946...	42	36	32	37	62	14	223

While the departmental increase is primarily due to returning veterans, there is reason to believe that student interest in Civil and Sanitary Engineering has, to a certain degree, been reawakened. Graduate enrollment in both Civil and Sanitary Engineering was limited by quotas, with qualified applicants exceeding the available openings, especially in Civil Engineer-

ing. The Civil Engineering graduate group included fourteen Army Engineer officers, who were succeeded by a second group of thirteen officers in June.

The reactivated student chapter of the American Society of Civil Engineers enjoyed a successful year, with Professor Charles H. Norris as faculty adviser; the award of a certificate of merit from the parent society was the first ever received by our chapter.

In December another department news letter was sent to the living graduates of this Department, who now number approximately 2,500.

The Visiting Committee for the Department, under the able and active chairmanship of Thomas C. Desmond, '09, held two well-attended meetings and was extremely helpful in organizing the new undergraduate Civil Engineering curriculum. Its members were also instrumental in forwarding a program to improve our laboratory facilities.

Surveying Camp. After having been closed during the war, the Summer Surveying Camp was put into condition for operation in preparation for the summer of 1947. Although the buildings were in good condition, it was necessary to install a new power plant and to carry out extensive repairs to the water supply system, filter bed, plumbing, camp road, and other miscellaneous items. This work was ably conducted under the direction of Professor Herman J. Shea, who is in charge of the camp, and Professor Allan T. Gifford, the camp administrative officer. One hundred and thirty students were scheduled to attend the camp during the summer of 1947. Because of limitations of staff, living quarters, and equipment, it was not possible to have the entire group attend the camp simultaneously for the usual eight-week period. As a temporary alternate, the camp period was divided into two sessions, with each student in attendance for four weeks. Professor Shea, who is now in charge of our work in surveying, has been promoted to the grade of associate professor.

Structural Division. The Structural division, which has long enjoyed an excellent reputation, particularly in the graduate field, has reorganized its graduate program. The subjects "Advanced Structural Theory" and "Statically Inde-

terminate Structures" have been consolidated into a single subject, "Statically Indeterminate Structures," which has our most advanced undergraduate structural theory as a prerequisite. This consolidation released time for a new subject, "Advanced Structural Mechanics," which will deal with structural applications of the theories of elasticity, elastic stability, thin plates and shells, and vibrations. Both terms of Advanced Reinforced Concrete Design have been stepped up so that undergraduate concrete design is now a prerequisite, and the scope of these subjects has been broadened to include a consideration of more types of civil engineering structures. Arrangements have been made with the Department of Naval Architecture and Marine Engineering so that officers of the United States Navy taking graduate work in Naval Construction and Engineering and specializing in basic hull design and structures will take a sequence of six undergraduate and graduate courses in structural theory.

In the Structural Analysis Laboratory, the investigation of the strength of timber floors, conducted in cooperation with the Liberty Mutual Insurance Company, was completed. A study of the elastic stability of welded struts and flexural members, sponsored by the Welding Research Council, is now well under way, and will continue. Professor John B. Wilbur and Professor Charles H. Norris acted as consultants to the War Department, working with the Office of the Chief of Engineers on problems of structural analysis and design in connection with the effects of bombs and other projectiles. One phase of these problems, namely, the determination of permissible fiber stresses in concrete structures acted upon by impulsive loads, is the object of an experimental investigation being carried out in the Laboratory of Structural Dynamics by Robert J. Hansen and financed by the Office of the Chief of Engineers. Myle J. Holley, Jr., was promoted to the grade of assistant professor and John M. Biggs was appointed instructor in structural engineering to fill the vacancy caused by the resignation of Charles F. Peck, Jr. In March, Professor Wilbur received the Clemens Herschel Award of the Boston Society of Civil Engineers for his paper, entitled, "The Action of Impulsive Loads on Elastic Structures."

Fluid Mechanics. The content of our undergraduate subjects in fluid mechanics has been modified, under the direction of Professor Arthur T. Ippen, so that they will be of broader scope and more fundamental nature. Graduate subjects in that field have been completely reorganized, with the following subjects now offered: "Applied Hydromechanics," "Free Surface Flow," "Seminar in Hydromechanics," and two terms of "Experimental Hydromechanics." All existing facilities in the old River Hydraulics Laboratory in Building 21 have been reconditioned, improved, or converted, and a number of new pieces of equipment were added for instructional or experimental purposes, including a flume for the study of density currents, a lucite spillway model, a lucite tank for the study of wave forms, a small flume for scour studies on hydraulic structures, and a flume for the study of standing wave patterns. A number of research proposals were prepared during the year, covering experimental phases of fluid mechanics problems that were within the scope of the present laboratory facilities. Funds have already been allocated for the following projects: for the United States Army Air Forces, a study of supersonic flow of gases by means of the hydraulic wave analogy; for the research committee of the American Society of Civil Engineers, one study dealing with the intensity of density currents in reservoirs and another with oscillatory waves in open channels. Four other research proposals are still pending.

This research program, together with the instructional and thesis demands on the old laboratory, will cause an unprecedented load on the space and equipment available. The need for the new Hydrodynamics Laboratory has become truly urgent. During the year the space distribution in the proposed structure was developed, and the preparation of detail drawings undertaken by the firm of Perry, Shaw and Hepburn. This work is nearly completed. James W. Daily of the hydromechanics laboratory at the California Institute of Technology joined the staff as assistant professor of hydraulics in the fall of 1946 and has collaborated closely with Professor Ippen on the many activities that have been carried on by the Hydraulics division during the past year.

Sanitary Science. The William T. Sedgwick Laboratories of Sanitary Science are now essentially completed and will be available for purposes of teaching and research beginning with the fall term of 1947. For the first time in the long history of Sanitary Engineering at the Institute, all the instruction in this field will be given in this Department. Our excellent laboratory facilities should enable us to keep our Sanitary Engineering program in the forefront of similar disciplines in the United States. Under the general supervision of Professor William E. Stanley, the Sanitary Bacteriology section of the laboratories will be directed by Professor Murray P. Horwood, the Sanitary Chemistry section by Professor Clair N. Sawyer, and the Sanitary Engineering section by Ariel A. Thomas, who was promoted this spring to the rank of assistant professor.

An investigation into the use of chlorine in the treatment of industrial wastes was initiated and will continue under the direction of Professor Sawyer. This study is financed under a grant-in-aid donated by the Wallace and Tiernan Company, Inc. A second grant-in-aid was received from the National Institute of Health for research on the nutritional aspects of the activated sludge method of sewage treatment; the research will be under Professor Sawyer's supervision. The requirements for admission to the Graduate School for work in Sanitary Engineering were modified so as to be more adaptable to men whose undergraduate work has been in fields other than civil engineering. Special consideration was given to graduates in chemical engineering who may wish to specialize in the operational phases of sanitary engineering.

Soil Mechanics. The Soil Mechanics Laboratory has undertaken a research project for the United States Corps of Engineers dealing with the solidification of soils in the field of chemical agents. Working on this project is a staff guided by a steering committee under the chairmanship of Professor Donald W. Taylor. The colloidal aspects of this problem have proved to be particularly important, and Professor Ernst A. Hauser of the Department of Chemical Engineering, a member of the steering committee, has been extremely helpful. Professor Taylor has served as a consultant to the United States Corps of Engineers on five projects that include the test tunnel

for the Garrison Dam and a test section for determining flexible pavement behavior under wheel loads up to 200,000 pounds at Stockton, California. Both Professor Taylor and Thomas W. Lambe have served as consultants in connection with stability and seepage problems on the Union Falls Dam in Maine.

Transportation Division. In the Transportation division, Professor John B. Babcock, 3d, has been active in professional society work, having served as vice chairman of the local sections administrative committee of the American Society of Civil Engineers, chairman of the subcommittee on cooperative relations with universities of the American Railway Engineering Association, and a member of the transportation committee of the civil engineering division of the American Society for Engineering Education. Professor Babcock continued his excellent work as placement officer for the Department. As was the case last year, his main concern in connection with placement activities was that of attempting to find available men to fill the many openings in civil and sanitary engineering.

Conservation. In May, the Department sponsored two well-attended lectures by Ira N. Gabrielson, President of the Wildlife Management Institute, who spoke on "Basic Concepts of Conservation of Land, Water, and Wildlife," and on the "Relation of Conservation to the Planning of Engineering Projects." Other lectures on conservation are planned from time to time. This activity will complement a new subject, "Principles of Conservation," which will be taken by students choosing the Planning and Administration option of our new undergraduate curriculum.

JOHN B. WILBUR

ELECTRICAL ENGINEERING

In last year's report the conditions and problems incident to the conversion from war to peace status were presented at some length. Most significant of these conditions were the unprecedented numbers and high quality of students, both undergraduate and graduate, and the financial support available for a scale of research limited only by our manpower and facilities. The problems included continual reappraisal of the

nice compromise between the pressure for admission of large numbers of able students and the maintenance of high educational standards; the shaping of research policies and programs to meet the Institute objective of making research projects a vital part of education; and the securing and use of staff, space, and facilities with utmost effectiveness to meet the great needs and opportunities facing the Department. These conditions and problems are still with us as student load on the Department continues to grow, but the year saw gratifying progress in re-establishing the training of men by peacetime standards and the advancement of knowledge as the primary goals.

While our very large undergraduate enrollment precludes attaining the ideal individual treatment of students, the individual project and conference scheme of laboratory operation was resumed. By maintaining a low student-to-staff ratio, we kept most class sections sufficiently small to permit individual discussion and the personal acquaintance of the instructor with each student. In graduate work each student is known individually by at least a few of the staff, the doctorate candidates by many. Thus despite numbers we are achieving a substantial measure of the individual association between student and staff that we regard as most important. More specific statements on the various phases of the Department follow.

Staff. At the senior level, changes include the resignations of Professors Ralph D. Bennett and Wilmer L. Barrow, who were on leave during the wartime period, and of Professor Malcolm S. McIlroy. Professor Bennett continues with the Naval Ordnance Laboratory, Professor Barrow continues with the Sperry Gyroscope Company, and Professor McIlroy has joined the staff of Cornell University. Professors William H. Timbie, Waldo V. Lyon, and Lyman M. Dawes reached the retirement age, Professor Timbie after twenty-eight years of active leadership of the Cooperative Course, Professor Lyon after forty-two years of teaching and research in electrical machinery, and Professor Dawes after twenty-four years of teaching, largely in the field of applications of electricity to industry. Of these three professors, Lyon and Dawes will be available during the ensuing year as part-time lecturers.

Additions to the staff have brought as associate professors

Leo L. Beranek, who is a well-known specialist in acoustics; Lan Jen Chu, noted for his work in antennas and wave applications generally; and Eugene W. Boehne, who comes to us after twenty years of industrial experience with the General Electric Company and who will replace Professor Timbie as head of the Cooperative Course. New Assistant Professors include John F. Reintjes, who has returned to us from industry after previous duty in the Radar School, and J. Earl Thomas, Jr., who will be working with Professor Ivan A. Getting on the synchrotron project.

Professors Samuel H. Caldwell, Ivan A. Getting, and Arthur R. von Hippel have been promoted to full professorships; Jerome B. Wiesner to an associate professorship; and Marcy Eager, Robert M. Fano, and James N. Thurston to assistant professorships. The Department for the fall term of 1947 will have an active staff of ten full professors, seventeen associate professors, fifteen assistant professors, two lecturers, thirty-six instructors, fifty-two assistants, twenty-three research associates, seventy-seven research assistants, four guests, and seven nonresident instructors to take care of the teaching and research load of the year, which is expected to be an all-time high. The additional men procured during the past year have, in many cases, had very desirable experience in engineering, research, or teaching or a combination of these. The staff engaged for the coming academic year, totaling approximately 243, is nearly three times the prewar maximum. With the large increase in new staff, attention has been given to teaching techniques, and Dean Donald D. Durrell of Boston University was secured to lecture on the basic essentials of good teaching. Additional conferences on teaching methods are planned during the ensuing year.

The second edition of *Principles of Radar*, which was prepared by the staff of the Radar School, appeared during the past year and had a very large sale. Work is actively in progress on the third edition, which should issue in about a year. Dr. Beranek is engaged in writing a manuscript entitled "Acoustic Measurements" under contract with the Office of Naval Research.

In June, Professor Albert C. Hall presented by invitation

a series of lectures on "The Design of Automatic Control Systems for Aircraft" at the University of California at Los Angeles before a group of West Coast experts in industry.

Participation by staff members in the work of professional societies continued, with a large number of papers being presented. In particular, the Department was active in the affairs of the American Institute of Electrical Engineers, the Institute of Radio Engineers, and the American Society for Engineering Education. In the American Institute of Electrical Engineers, Professor Truman S. Gray was chairman of the Boston section and also chairman of the large national instruments and measurements committee. In the Institute of Radio Engineers, Professor William H. Radford is chairman of the committee on education and has been elected chairman of the Boston section for the coming year. Professor Gordon S. Brown served as chairman of the subcommittee on servomechanisms of the American Institute of Electrical Engineers; Professor Carlton E. Tucker is chairman of the New England section of the American Society for Engineering Education; Professor Ernst A. Guillemin is chairman of the committee on circuits of the American Institute of Electrical Engineers.

Several Faculty members, including Professors Edward L. Bowles, Gordon S. Brown, Samuel H. Caldwell, Ivan A. Getting, Jerome B. Wiesner, William H. Radford, and Arthur R. von Hippel hold consulting or committee positions with governmental agencies.

Graduate School. The graduate quota was increased to 170 regular students for the spring term, in addition to which thirty or forty special graduate students from D.I.C. and industry took one subject each. This quota has been increased to 260 for the coming year, an increase forced by the need for teaching and research staff, the commitments to the armed services, and the obligations to Course VI-A. While two-thirds of these students are full-time junior staff members taking 40 per cent of a full-time graduate-student program, such numbers were unthought of until the present educational emergency. The year went smoothly as a result of much care in planning, and the next year appears to offer no insuperable problems. While the large research activity is in part responsible for the

graduate load, its net effect is a marked stimulation of student research effort, supported by exceptionally fine and extensive facilities. We are, however, carrying the great graduate load on a semiemergency basis, which taxes staff and facilities beyond the safe limit for the long term.

Graduate work for the armed services is a major activity. Two groups of Signal Corps officers are now in the Graduate School, one group of Army Ordnance officers, and one Air Forces officer. The Navy is continuing to send men for the programs in fire control and ordnance electronics, and in the fall of 1947 will send a sizable group for a two-year program on guided missiles.

During the year arrangements were made to offer five additional graduate subjects: "Synthesis of Optimum Linear Systems," to be presented by Professor Yuk Wing Lee; "Design of Automatic Control Systems for Aircraft," to be presented by Professor Albert C. Hall; "Electrodynamics of Particles," to be presented by Professor Ivan A. Getting; "Modulation, Noise and the Transmission of Information," to be presented by Stanford Goldman; and "Advanced Acoustics," to be presented by Professor Leo L. Beranek.

Graduate registration reached an all-time high of 216 in February, 1947. Interest in servomechanisms subjects, network analysis, transients in linear systems, and pulse circuits continued to be very great.

Undergraduate Teaching. In view of the department loads, new developments in undergraduate teaching are being retarded temporarily. Considerable thinking and discussion are going on, however, as to the implications of war developments on the emphases and directions toward which electrical engineering training should trend. Thus it is hoped that the broad thinking underlying any substantial changes will be crystallized by the time staff effort becomes available for intensive work. Meanwhile extensions and development of the popular fields of control and measurement for seniors are occurring. Also, Professors Arthur E. Fitzgerald and Charles Kingsley, Jr., are developing for trial a unified approach to rotating electrical machinery as one part of the broader subject of interconversion of electrical and mechanical energy generally.

The Radar School has been operating as an integral part of the Department, with radar laboratories still located at Atlantic Avenue. The program is now so arranged that it leads to the degree of S.B. in Electrical Engineering, and already two classes have been graduated, one in February and one in June, 1947. The present enrollment of Navy officers in the school is about 150.

We are still under very considerable pressure as to space, being probably the most crowded department in the Institute. It is possible to handle the present numbers of students only because of the fact that we utilize the laboratories practically continuously and consequently have a very high load factor.

Research. The research activity of the Department continued broadly along the lines indicated in last year's report. Since the interdepartmental laboratories in which this Department is a partner — namely, the Research Laboratory of Electronics, the Laboratory for Nuclear Science and Engineering, and the Acoustics Laboratory — are reported separately, mention is made here only of the highly satisfactory and fruitful nature of these enterprises, from the point of view of the Department, in education and research and in interdepartmental intercourse.

The Servomechanisms Laboratory under Professor Gordon S. Brown is still conducting research on advanced fire-control systems in collaboration with Professor C. Stark Draper of the Department of Aeronautical Engineering. Research on high-speed digital computation using electronics techniques is being conducted under the direction of Jay W. Forrester. Since there was inadequate space in Building 32 to house this additional activity, the Barta Building at 209 Massachusetts Avenue was acquired by the Institute and will be fully used by this project. A significant new activity in the Servo Laboratory, with important educational and research implications, stems from the request by the Brookhaven National Laboratory for assistance in control and instrumentation problems on their nuclear reactor pile No. 1.

The work of the Dynamic Analysis and Control Laboratory under Professor Albert C. Hall was principally concerned with the development of an aircraft simulator. In addition, work

was carried through on the mathematical computation of trajectories for missiles and the development of instruments and mechanisms for use in control systems. The first model of the aircraft simulator is now being completed and appears most promising.

Under a contract with the Office of Naval Research sponsored by the Signal Corps and the Navy, the Laboratory for Insulation Research under Professor Arthur R. von Hippel returned to a long-range program of unrestricted fundamental research in the broad field of dielectrics. The various groups in the laboratory are qualified and equipped to bring to bear the methods and points of view of the physicist and the chemist as well as the electrical engineer toward the basic understanding of dielectric and semiconducting materials and processes. Working staff and facilities are available for very comprehensive measurements of dielectric constant and loss, including measurements at microwave frequencies, spectroscopy from 0.2 to 15 microns, X-ray and electron diffraction, high-voltage a-c, d-c, and transient breakdown, dielectric material synthesis and fabrication, both organic and inorganic, and for parallel theoretical studies. Among the materials under study are the newly discovered group of titania ferroelectrics, ferromagnetic semiconductors, and glasses. Also being studied is the synthesis of new organic multi-ring compounds as a first step toward a systematic study of electronic conduction in organic substances. Ten publications appeared from the laboratory. Dr. von Hippel is preparing a textbook on dielectrics.

The High-Voltage Research Laboratory under Professor John G. Trump cooperated with the Department of Food Technology, using penetrating radiation in the sterilization of foods, serums, and drugs. The pressure-insulated Van de Graaff generator in Building 28 was employed in the treatment of about 150 patients having deep-seated malignancies. A grant was received from the Hyams Trust for continuing the investigation on properties of supervoltage rays for cancer therapy, and Building 28 is being enlarged and the generator improved for more reliable operation at higher voltage.

The activity of the Center of Analysis, under the direction of Professor Samuel H. Caldwell, continued at a high level

despite the termination of full-time war work. Differential analyzer work included studies of relay operation, lubrication phenomena, and variable-pitch propeller control, and some work still classified. The computing section completed and published tables on the supersonic flow of air around cones, both for the symmetrical case and for yawing cones, and expanded its activity in the exploration of the physical properties of the upper atmosphere from a study of meteor phenomena. Under the sponsorship of the Rockefeller Foundation, research on electronic computation was resumed on July 1, 1946, but was voluntarily stopped on June 30, 1947, to avoid duplicating work of a major Servomechanisms Laboratory project whose objectives had so evolved as to become identical. The equipment thus made available is being used to strengthen our teaching program in electronic computing techniques.

The Naval Ordnance Development Award was presented to the Servomechanisms Laboratory and to the ballistics computation group of the Center of Analysis for distinguished service in the war effort. The President's Office received the bronze plaque commemorating the work of the Institute in education during the war, mentioning accomplishments of the Radar School in particular.

In Professor Harold E. Edgerton's laboratory active interest has centered on the problems pertaining to sources of short-duration light flashes of three types: those capable of producing tremendous quantities of light of quality suitable for color photography, those for high repetitive rates, and those for producing very short flashes. Notable results in the colored photography of large spectacles were obtained.

Professor Ivan A. Getting's synchrotron project is a portion of this Department's work in the Laboratory for Nuclear Science and Engineering and is included in that laboratory's report.

The departmental staff seminar was initiated for the purpose of acquainting staff members with projects at M. I. T. and advances elsewhere in the electrical and related fields. Attendance was large and frequently included non-Institute persons who had requested the privilege of attending.

One of our Alumni, John B. MacNeill, '13, was awarded

the Lamme Medal by the American Institute of Electrical Engineers for his farsighted leadership and creative contribution in the development of switching equipment.

HAROLD L. HAZEN

GRAPHICS

Increased emphasis was placed on graphical methods of interest to the engineer. In Engineering Drawing, students having some high-school experience were permitted to apply for special sections in which valuable graphical processes were substituted for the more elementary drawing exercises. This work was correlated to the graphical needs of other interested departments and resulted in an increased appreciation of graphics as a tool of attack on physical problems. Further expansion in this direction is planned.

Professor Earle F. Watts is collecting and correlating major graphical methods currently in use in the various sciences with a view toward a simplified presentation of basic methods.

Professor Douglas P. Adams is evaluating and making a bibliography of all published nomograms in selected scientific fields. This will be a much needed contribution to graphical literature.

JOHN T. RULE

MECHANICAL ENGINEERING

Applied Mechanics. There were no major changes in the curriculum in Applied Mechanics. Current problems concern matters of teaching, arising from the exceptionally heavy enrollment and the consequent large number of new junior staff members, complicated by unusual absences due to illness.

Professor Jacob P. Den Hartog assumed an increasing share of responsibility for the Applied Mechanics program, coordinating second-year subjects having a large number of sections. A similar coordination was effected for third-year subjects by Professor Charles W. MacGregor. As a result of careful planning, the heavy registration for the coming year should be carried with a minimum of difficulties.

Considerable progress was made in building up demonstra-

tion apparatus for the recently established Laboratory for Dynamics and Control under Professors Den Hartog and John A. Hrones. The principal items consist of mechanical models and an electric simulator to demonstrate the characteristics of simple control systems. Part of this apparatus was made by students in connection with undergraduate and graduate theses. The laboratory also acquired a very complete hydraulic test stand.

Results of the work of Professor William M. Murray in experimental stress analysis were introduced into the instruction in Strength of Materials and in the Testing Materials Laboratory.

Notable developments in the instruction in advanced aspects of Fluid Mechanics took place outside of the Applied Mechanics group. Professor Hsue-Shen Tsien in "Aerodynamics of Compressible Fluids" and Professor Ascher H. Shapiro in "Flow of Compressible Fluids" offered special versions of this science which are outstanding examples of scholarship and student inspiration. This is a diffusion of the field of Applied Mechanics which may be expected to grow in future years. A similar diffusion is taking place into the mechanism of friction, lubrication, wear, and the cutting of metals, from the work of Professors John T. Burwell, Jr., and Milton C. Shaw. The application of the basic instruction in Applied Mechanics to the field of stress analysis and materials testing, under Professors MacGregor and Murray, is another example of the same tendency. It is through coordination of the instruction in Applied Mechanics with the results of current research in this Department that we expect to retain the vigor and vitality of the instruction in fundamentals.

Machine Design. A major revision of undergraduate instruction was undertaken to enable students to deal with design problems arising from the operation of machinery at high speed. To do this it was necessary to eliminate much of the material previously covered. By close cooperation with the division of Applied Mechanics, instruction in Machine Design was so coordinated with the teaching of Strength of Materials, Dynamics, and Fluid Mechanics that it was possible to eliminate considerable repetition which previously existed.

Students are now required to design a complete operating machine where previously they were asked to deal only with machine elements. Every attempt is being made to encourage original thinking.

The Kerr Fund enabled us to start a collection of design books for reference use by students. Work is well under way on a complete and up-to-date industrial catalogue file which should in time become the most complete file of its nature in this locality. It is already being widely used by students and research workers in other departments. A machine design exhibit was initiated with the purpose of providing visual aids to design education.

The Visiting Committee for the Department endorsed plans for establishing a suitable seminar and design room to create an atmosphere favorable for comparative design studies and to encourage students with a major interest in this art.

Testing Materials Laboratory. A high-speed impact apparatus containing a flywheel with electronic controls was erected. A whirlpit for bursting heavy steel discs under high-speed rotation was completed in the basement of Building 1 and is in successful operation. New laboratories for the study of creep and fatigue of metals are now being equipped. Several special creep-testing machines were constructed in the department shop, and three fatigue-testing machines were acquired, one from General Motors and two from war surplus.

Through the generosity of Cyclograph Services, Ltd., of Toronto, the laboratory has been loaned a cyclograph for studying internal magnetic effects produced by stress.

Additional testing equipment made it possible to extend the scope of subjects for graduate theses.

Four sponsored research projects were carried out under the supervision of Professor Charles W. MacGregor: stress analysis problems, for the Bureau of Ordnance, United States Navy; high-speed rotating discs, for the Welding Research Council; brittle fracture, for the Welding Research Council; and creep of metals, for the Office of Naval Research.

A Navy project was set up to study the effects of cyclic stress on the impact characteristics of ship steels. This is associated with the study of the failures of ship plate, coordi-

nated through a National Research Council committee of which Professor John M. Lessells is a member. Professor Lessells continued to serve as editor of the *Journal of Applied Mechanics* of the American Society of Mechanical Engineers.

Machine Tool Laboratory. The Machine Tool Laboratory was rearranged to permit sections for instruction to be enlarged from forty to fifty students each. Twenty-two modern motor-driven machine tools obtained from war surplus were installed. Facilities of the Ordnance Gage Laboratory were used for instruction in machine tool practice for the first time.

The working schedule in the laboratory became most unpopular — 9:00 A.M. to 6:00 P.M. without a lunch period for three days of the week. This was due to heavy registration and limited facilities.

There are now in the warehouse the modern machine tools required for a new laboratory when space is available for this much needed expansion.

Lubrication. An elective course on "Lubrication and Friction" was inaugurated by Professor John T. Burwell, Jr., dealing with principles underlying the design of sleeve and thrust bearings and the mechanism of dry friction, galling, and seizure.

The research on wear, for the National Advisory Committee for Aeronautics, continued the study of the transfer of material between rubbing surfaces by means of radioactive indicators. The results should throw light on the formation of the hard layer found on run-in piston rings and cylinder barrels.

The research program supported by the Chrysler Corporation, discontinued during the war, was revived. It deals with three problems: material transfer between wearing surfaces, effect of interrupted surface on wear and friction, and bearing performance under dynamic loading.

Heat Division. In the Heat division slight changes were made in the instructional material covered. Course 2.43, which was mostly devoted to heat transfer with some work on refrigeration, is now devoted entirely to heat transfer and mass transfer. The instruction in refrigeration is given in 2.42, time having been found by a rearrangement of topics. A new course on kinetic theory was offered by Professor H. Guyford Stever

and a graduate course in the high-speed flow of compressible fluids by Professor Ascher H. Shapiro.

In each of the three one-year graduate subjects, the students took a large share of responsibility for their instruction and self-development in the second term by preparing term project reports which were submitted for criticism both orally and in writing.

Under sponsorship of the National Advisory Committee for Aeronautics, an experimental project on the measurement of fluid friction coefficients in short tubes was completed by Professor Shapiro, who also supervised research for Project Meteor on the mixing of parallel gas streams, on a supercritical water channel to serve as an analogue and an adjunct to supersonic wind tunnels, and on an investigation of the interaction between shock waves and boundary layers in supersonic flow (with Professor Ernest P. Neumann).

Tables of the properties of air and of products of the combustion of hydrocarbons, for use in the design of gas turbines and related devices, are nearing completion under the direction of Professors Joseph H. Keenan and Joseph Kaye. They will include tables of functions employed in calculating the flow of compressible fluids at subsonic and supersonic velocities.

Under sponsorship of the Navy, work is progressing on the measurement of recovery factors and heat transmission coefficients for air flowing in a tube at supersonic speeds. This work is under the direction of Professors William H. McAdams, Joseph H. Keenan, and Joseph Kaye.

Owing largely to the initiative of junior staff members, students in the Heat division were given an opportunity to rate their instructors as to teaching skills. The results were stimulating to the staff members and probably affected favorably the quality of instruction. Next year the rating of instructors by students is to be extended to the whole Department.

Engineering Laboratories. Two special laboratory-type steam turbogenerators were installed, complete with condenser, condenser auxiliaries, switchboard, and resistance banks for loading. These units simulate the operation of a power plant on a small scale and will be used for laboratory and thesis work.

A large air ejector, obtained from war surplus, was in-

stalled for research and laboratory work. Facilities for thesis research have been augmented as a result of the extensive modernization program authorized last year.

Refrigeration. A research project under the supervision of Professor August L. Hesselschwerdt, Jr., for the American Society of Refrigerating Engineers continued through the year, and also a project supported by the Refrigeration Research Foundation, supervised by Professor Samuel C. Collins, with Professors Bernard E. Proctor and James Holt as advisers.

Cryogenic Engineering. Work continued on projects sponsored by the Army Air Forces relative to the generation, storage, and transportation of oxygen and to the production and maintenance of low temperatures.

A special low-pressure plant for the production of liquid nitrogen and liquid oxygen, designed by Professor Collins, is now being built for the laboratory.

Gas Turbine Laboratory. Construction of the Gas Turbine Laboratory progressed to the point where full operation can be anticipated for the academic year 1947–1948. The laboratory contains a supersonic wind tunnel with eight-inch by nine-inch throat, capable of operating up to a Mach number of 3; an air supply for combustion experiments; a low-speed wind tunnel for testing compressor and turbine blade shapes; and miscellaneous smaller pieces of equipment. A ten-inch schlieren apparatus and a five-inch Jamin-Mach interferometer have been completed and are now available.

While the major items of equipment were under construction, experiments on the characteristics of flame holders were conducted in the laboratory, under the supervision of the Department of Chemical Engineering. A project on the mixing of concentric gas streams, one on supersonic nozzle design, and one on the characteristics of supersonic diffusers have already yielded interesting results. Apparatus for investigating the flow of air through cascades of airfoils is approaching completion.

A new course in the principles of jet propulsion engines was offered for graduate students by Professors Edward S. Taylor and William R. Hawthorne.

Sloan Automotive Laboratory. The program of expansion and modernization was completed and the test equipment

should be ready for operation at the beginning of the 1947 fall term. Thanks to the generous gifts of Alfred P. Sloan, Jr., '95, and the availability of a very considerable amount of war surplus equipment, the Sloan Laboratory is now one of the best equipped of its kind and should be ready to meet the larger enrollments expected in the future.

The alterations included seven new soundproofed and ventilated engine test cells, a separate building for fuel storage, and considerable increases in electrical power and combustion air supply. New equipment included five new dynamometers with eddy current clutch for speed control and power absorption, one General Electric high-speed dynamometer with Ward-Leonard amplidyne control, three CFR research engines, one M. I. T.-type engine indicator. From the Navy, we received a 150-horsepower Fairbanks-Morse Diesel engine and a German free-piston compressor of novel type.

A small piston-ported, high-output, blower-scavenged, two-stroke cylinder was designed and built for demonstration and research on the characteristics of the two-stroke cycle.

While the expansion of this laboratory was not directed toward sponsored research, facilities for this purpose have been improved in quality. During the course of the year, two projects for the National Advisory Committee for Aeronautics were completed and two new projects in continuation, but with industrial sponsorship, were undertaken. These are a study of the self-ignition characteristics of fuels, for the Ethyl Corporation, and a study of air motion in an engine cylinder for the Texas Company. Professor C. Fayette Taylor is in charge of these projects.

Textiles. The Textile division engaged in several research projects, including the improvement of parachute suspension lines for the Army Air Forces; the special facilities of the Slater Memorial Research Laboratory were used for measurement of impact performance.

Instrumentation development was focused on a constant rate-of-deformation compression tester utilizing a resistance strain gauge cantilever weighbar; a hypersonic device for measuring the modulus of elasticity of continuous filament yarns; an improved stress relaxation yarn tester; and a con-

stant rate-of-extension tester utilizing a resistance strain gauge cantilever weighbar and servomechanisms for constant speed control. These developments took place in the joint Textiles-Plastics Instrumentation Laboratory, where common instrumentation problems are undertaken.

War Surplus. In addition to machine tools sufficient to equip the projected Machine Tool Laboratory and certain equipment for the Sloan Automotive Laboratory, acquisitions from war surplus included a 200,000-pound-capacity hydraulic testing machine, two rotating beam fatigue machines, two pendulum impact testers, a hydraulic test stand for control apparatus, a balancing machine, and a large quantity of selsyn motors, bearings, gears, and parts suitable for incorporation into mechanisms of various kinds. This latter material is proving very valuable for students' theses.

After being assigned to half-time duty on surplus property acquisition for nearly two years, Professor William M. Murray resumed full-time teaching duties.

Cooperative Research. Thirty-one research projects of professional interest to the Department were carried on for the Division of Industrial Coöperation. The sponsors were industrial corporations (eight), the Army (four), the Navy (eight), Maritime Commission (one), National Advisory Committee for Aeronautics (seven), and professional societies (three). Junior staff members were added in sufficient numbers to permit the assignment of twelve senior members of the staff to supervise these projects as part of their departmental duties.

Placement. There was a lively demand from industry for students completing either undergraduate or graduate programs in Mechanical Engineering. Some of the graduates had several offers from which to choose. Professor Arthur L. Townsend acted as adviser to students in placement matters, and inaugurated a program for following up their future progress as employees. The Department hopes that an annual check with recent graduates will enhance the wisdom of its counsel.

Student Societies. In June, a chapter of Pi Tau Sigma, national honorary mechanical engineering fraternity, was established at the Institute, with an initial membership of twenty-one students and nine members of the faculty who were

elected to honorary membership. Professor Alvin Sloane was named faculty adviser. Student branches of the national engineering societies continue to serve as a focus for student initiative and extracurricular professional interests.

Staff Honors. Professor C. Richard Soderberg served on the subcommittee on turbines of the National Advisory Committee for Aeronautics, on the Scientific Advisory Board of the Army Air Forces, and on the research committee of the Society of Naval Architects and Marine Engineers. He was elected a member of the National Academy of Sciences. The Naval Ordnance Development Award was given to Professor Shapiro and Professor Soderberg for their work during the war on torpedoes. Professor Hunsaker was made an honorary member of the Institution of Mechanical Engineers of Great Britain.

Department Headship. At the end of the academic year Professor Hunsaker was relieved as head of the Department by Professor Soderberg, who had acted as his deputy during the war years. There will consequently be a smooth transition to the guidance of a colleague who has shared in the evolution of present policies and programs.

JEROME C. HUNSAKER

METALLURGY

Conversion of the Department from wartime research to a normal teaching and research program continued during the year with several major changes. Two large projects sponsored by the Atomic Energy Commission, which had occupied large areas of departmental laboratories during the war, were moved to separate quarters. These projects are being continued under the direction of staff personnel. One is headed by Professor Albert R. Kaufmann and the other by Professor Antoine M. Gaudin.

Government-sponsored research continues on a large scale. In addition to the above, there are several projects, involving: (1) the development of alloys for high-temperature service, under the direction of Professor Nicholas J. Grant; (2) a study of iron-nitrogen alloys; (3) the vapor deposition of refractory metals; (4) the development of high-temperature refractories

with good temperature shock resistance; (5) the dimensional stability of metals; (6) the physical chemistry of steelmaking; (7) a study of erosion-resistant materials; (8) a study of permeability of porous metal parts; (9) effect of strain on the hardening of steel; (10) hard metal carbides; and (11) chemical properties of intermetallic compounds.

In all of these programs an attempt is made to integrate the research with our educational program. This is done largely by the appointment of graduate students as research assistants. Such students have the privilege of taking graduate courses, and the work which they do for the project contributes toward a thesis for an advanced degree.

Research sponsored by private industry has also increased greatly compared to prewar standards. Grants-in-aid and fellowships have been received during the year from Armour and Company, Republic Steel Corporation, Titanium Alloy Manufacturing Company, Unexcelled Chemical Corporation, Vanadium-Alloys Steel Company, S. K. Wellman Company, Revere Copper and Brass, Inc., Gray Iron Founders Society, Loeb Foundation, Sheffield Foundation, Metals and Controls Corporation, and the United Engineering Trustees, Inc.

Reconversion of the laboratories to instructional purposes involved several space reassignments. The X-ray Metallography Laboratories were moved to the first floor and completely modernized. This permitted the expansion of the physical metallurgy research facilities and also the installation of a modern, well-equipped metallography laboratory. In the Mineral Dressing division, a new surface measurement laboratory was installed.

During the year a new corrosion laboratory under the direction of Professor Herbert H. Uhlig was created. This is a joint project with the Departments of Chemistry and Chemical Engineering but is attached to Metallurgy for administrative purposes. The importance of research in this field is evident to everyone, and the establishment of this laboratory fulfills a need that has been recognized for several years.

The laboratories for forging, welding, forming, and casting of metals, developed in the Department of Mechanical Engineering, were transferred to the Department of Metallurgy in

the summer of 1946. These activities, together with powder metallurgy, are housed in Building 35 and are now known collectively as Mechanical Metallurgy, a division of the Department of which Professor John Wulff is in charge. Instruction in this field is under the joint supervision of the Heads of the Departments of Mechanical Engineering and Metallurgy.

While a number of our laboratories have been completely modernized, the need for new equipment, facilities, and space modernization in several others is critical. These include the Laboratories for Mechanical Metallurgy in Building 35, the Process Metallurgy Laboratory, the Heat-Treatment Laboratory, and the Metallography darkrooms.

During the year the undergraduate Metallurgy curriculum was completely revised. The new curriculum replaces the previous descriptive courses with new and more quantitative subjects. In the junior and senior years, the Metallurgy courses are divided into (1) a sequence of courses in the fundamentals of Physical Metallurgy, followed by advanced professional courses in this field; and (2) a sequence of courses in the unit operations of Process Metallurgy, including Mineral Dressing. In the senior year sufficient elective time is provided to enable the student to specialize to a certain extent in one of the major divisions of the field.

A new curriculum in Mineral Engineering replaces the old Mineral Dressing option. This provides a balanced course based on three sequences of subjects in Geology, Mineral Dressing, and Metallurgical Engineering. Graduates of such an option are needed if the United States is to continue to hold its economic position as the leading producer of most metals in the face of dwindling supplies of high-grade ores.

JOHN CHIPMAN

METEOROLOGY

The demand for graduate training in Meteorology has continued at a high level, and it has been necessary to refuse admission to a number of well-qualified applicants. No further increase in the graduate quota appears desirable with the existing limitations of staff and space. The number of undergradu-

ate students is relatively small. This situation appears to be due to the rather recent inauguration of the undergraduate curriculum and the general lack of appreciation by prospective students of the opportunities and interest of a career in meteorology. In view of the large wartime training programs in meteorology, the demand for meteorologists is surprisingly good and promises to become even better.

To assist the Army Weather Service to maintain necessary peacetime strength, the Institute in February accepted a group of twenty-three officers who are taking a special undergraduate program of two terms' duration designed to qualify the men as weather officers.

The Department has an active and well-balanced research program consisting of four principal projects, supplemented by smaller investigations carried on by individual staff members. The four main projects were continued from the previous year and are discussed briefly below. There is much additional research which could be advantageously prosecuted except for limitations of space and personnel.

The largest research project is known as Weather Radar Research and is under the direction of Alan C. Bemis. It operates under contract with the United States Army Signal Corps and with advisory assistance from the Research Laboratory of Electronics. Its objective, broadly, is to explore the uses of radar in meteorology. For several years microwave radar has served as a valuable instrument for the location and continuous observation of storm areas containing heavy precipitation, such as thunderstorms and cold fronts. Further study has revealed that many other meteorological factors may be observed by radar, including certain types of clouds or suspended precipitation, wind shear, the melting level where falling snow melts to rain, low-level density discontinuities, and others. The project operates its radar gear on the roof of Building 24 and obtains aerological data from special instruments carried aloft by an Army Air Forces airplane. The radar has already collected much observational material, but coordinated air-borne observations have only just begun. Analysis of results should teach us a great deal about the theory and

structure of storms as well as a great deal about the propagation of microwave radiation in the atmosphere.

The research on the mechanism of pressure changes and concomitant changes in atmospheric circulations has been continued under contract with the Office of Naval Research. This work is under the direct supervision of Professors James M. Austin and Thomas F. Malone, and many of the staff are contributing to it because of the fundamental nature of the problem. The main problem still remains to be solved, but good progress has been made in the necessary preliminary studies.

The joint Weather Bureau-M. I. T. extended forecasting project, under Professor Hurd C. Willett, continued unchanged from the previous year except that two Weather Bureau employees have been assigned to the project to assist in the extensive routine work involved in the preparation of mean-type weather maps. The project continues with the statistical and synoptic analysis of the general circulation of the atmosphere in its relation both to past climatic changes and to the problem of extended weather forecasting. Effort is now being made to evaluate the influence of the irregular variations of solar activity on the changes of the general circulation.

The hygrometer project continued under contract with the General Electric Company. The purpose of this program, which is being directed by Professor Delbar P. Keily, is to improve current methods for measuring humidity in the free atmosphere, particularly at low temperatures.

Under the auspices of the Lowell Institute Cooperative Broadcasting Council, members of the Department commenced in June a continuing series of weekly radio broadcasts, entitled, "Our Weather." These programs attempt to present the basic theories and concepts of meteorology so that they will be understandable and interesting to the average layman.

Professor Bernhard Haurwitz resigned in April to accept the chairmanship of the department of meteorology at New York University. Professor Austin was awarded the Medal of Freedom by the Commanding General, European Theatre of Operations, in recognition of his outstanding services as a civilian consultant in England and France during and preced-

ing the invasion. Professor Malone was appointed chairman of the committee on admissions of the American Meteorological Society, and Professor Houghton entered the second year of his term as president of the society. Professors Willett and Houghton were appointed deputy members of the panel on meteorology of the Joint Research and Development Board, and Professor Houghton served on two subcommittees of the National Advisory Committee for Aeronautics. In June, 1947, Professor Houghton was awarded the honorary degree of doctor of science by the Drexel Institute of Technology.

HENRY G. HOUGHTON

MILITARY SCIENCE AND TACTICS

The Department increased its activities in accordance with the postwar policy of the War Department by completing the reactivation of four advanced course units (Engineer, Signal, Ordnance, and Chemical). An Air Force unit was activated in the fall of 1946. Plans were completed during the spring and summer of 1947 for the activation of two units that will be new to the Department, the Army Security and the Quartermaster units. Plans were also completed for the reactivation of the Artillery unit, which will include instruction on all types of artillery weapons in accordance with the present policy for the combination of the Field Artillery, Antiaircraft, and Seacoast Artillery units.

Enrollment in the Reserve Officers' Training Corps increased to 474 freshmen and 197 sophomores, making a total of 671 in the elementary courses. A total of 116 students enrolled in the advanced courses.

Lieutenant Colonel Kenneth W. Holbert arrived on September 16, 1946, and assumed charge of the Air Force unit. He is assisted by Captain Jack W. Streeton, who arrived on December 14, 1946, and Lieutenant Frank H. Senn, who arrived on June 21, 1947. Major Hollis Dakin arrived on October 1, 1946, to take charge of the Signal unit. Lieutenant Colonel Curtis L. Varner arrived on June 19, 1947, to establish the new Quartermaster unit, and Lieutenant Colonel Herrick F. Bearce arrived on July 5, 1947, to head the new Army Security unit. Upon the departure of Lieutenant Colonel Thomas M.

Larner to attend the Command and General Staff School at Fort Leavenworth, Kansas, Major John C. Bolton assumed charge of the Artillery unit. He is assisted by Captain Robert L. Rooker, who reported for duty on May 22, 1947.

The Department sponsored the reactivation of the M. I. T. chapter of the Scabbard and Blade, a national military society for the Reserve Officers' Training Corps. The Department also supervised the activities of the voluntary M. I. T. drill team, which was very active throughout the year.

The department staff was augmented by the temporary assignment of Reserve officers for periods of active duty. Officers so assigned were Lieutenant Colonel John C. Worden on June 19, 1947, and Lieutenant Colonel Malcolm S. Stevens on August 4, 1947. The assignment of other Reserve officers for active duty in the Department is contemplated.

HAROLD R. JACKSON

NAVAL ARCHITECTURE AND MARINE ENGINEERING

Since the end of the war the student enrollment in Course XIII (Naval Architecture and Marine Engineering) has fallen off considerably, but the registration in Course XIII-C (Marine Transportation) has increased, although the enrollment in this Course is still small. The number of students in Course XIII-A (Naval Construction and Engineering) continues large, and in the fall term of 1947 we will have ninety-one United States naval officers, seven United States Coast Guard officers, and two Chinese naval officers taking graduate work in Warship Design.

In June we had two resignations from our teaching staff: Captain Lybrand P. Smith, Visiting Professor of Naval Engineering, and Professor Jere R. Daniell, Visiting Assistant Professor of Naval Architecture. Also during the year Captain William H. Buracker resigned as commanding officer of the United States Naval Training Schools at the Institute and as professor of naval science in this Department.

Vice Admiral Edward L. Cochrane, former chief of the Bureau of Ships, United States Navy, assumed the duties as head of this Department on September 1, 1947.

Commander Ernest C. Holtzworth, United States Navy, was detailed to the Institute by the Navy Department in

November, 1946, to succeed Captain Charles D. Wheelock, and has been appointed professor of naval construction and head of Course XIII-A. Captain Everett E. Mann, United States Navy, was ordered to the Institute in July, 1947, by the Navy Department, and has been appointed professor of naval engineering. He also takes over the position of commanding officer of the United States Naval Training Schools at the Institute. In the interim between Captain Buracker's resignation and Captain Mann's arrival, Professor Holtzworth temporarily filled this latter position.

It is with keen regret that we record the death on December 2, 1946, of Professor Henry H. W. Keith, former Head of the Department.

Important changes have been made during the past academic year in the curricula for student officers taking Course XIII-A. Prior to the fall of 1946 all students took the same subjects in this three-year Course. Because of the need of the Navy Department for engineering officers with a higher degree of specialization in the various engineering fields, seven specialized curricula have now been established, and in the future each class will be divided into seven groups. In these curricula about 75 per cent of the subjects are common to all; the other 25 per cent are in one of the seven fields of specialization.

Because of the large enrollment in the graduate subjects given in Course XIII-A, we are at the present time not offering graduate work leading to the master's degree in Naval Architecture. However, we continue to offer graduate work in Marine Engineering.

During the spring term graduates of the Course in Marine Transportation gave a series of five very successful lectures on some of the practical phases of ship operation. Each lecture lasted for two hours and was attended by all the juniors and seniors in Course XIII-C.

A number of construction models and half models of yachts and small vessels were presented to the Department by Frank C. Paine, President of the George Lawley and Son Corporation.

The operation of the Propeller Tunnel continues, with a program of fundamental research, part of which has been carried out as student theses.

LAWRENCE B. CHAPMAN

SCHOOL OF SCIENCE

Biology

The Department's rather unique teaching program in modern physical and chemical biology is under continual study by the staff for the purpose of coordination and extension of the subject matter presented. The introductory course was thoroughly revised. It is now under the supervision of Professor George T. Johnson, the entire staff participating in the instruction. A similar revision of second-year biology is in progress.

To broaden the scope of graduate teaching, new graduate elective courses were devised, including biological applications of electron microscopy (Professor Cecil E. Hall), ultrastructure of cells and tissues (Professor Francis O. Schmitt), special microscope methods (Professor John R. Loofbourow), and cytology and histology (Professors H. Stanley Bennett and David F. Waugh). The requirements for advanced degrees were modified somewhat to conform with the more unified program of the Department in the postwar period. Postdoctoral fellows in increasing numbers are seeking advanced training in the Department. The majority of these are medical fellows sponsored by foundations here and abroad, interested in research on a variety of diseases, including cancer, rheumatoid, and cardiovascular disease. Efforts are being made to accommodate, from a large waiting list, more Baruch fellows for training in physics and technology as applied in medicine. This course, given by Professor Kurt S. Lion, has now been partially integrated with that on physical instrumentation required of Course VII-A students.

Acquisition of a large number of new journals and completion of old files made available much needed literature in the fields of the Department's interests.

The research program, centering largely around molecular biology, was broadened both by the acquisition of new equipment and by the participation of graduate students in increasing numbers. The extension for six years of a grant from the Rockefeller Foundation in support of the general program is gratefully acknowledged.

Investigations of the structure of biological material were intensified. Addition of a third electron microscope facilitated wider participation of fellows and students in this fruitful field. Professor Francis O. Schmitt and associates continued their study of collagen and other connective tissue components (under contract with the Office of the Quartermaster General) and are also investigating nerve and blood cell constituents. Professor Cecil E. Hall and Marie A. Jakus continued their studies of the structure of muscle and muscle proteins, and Professor Hall made important advances in the development and application of dark-field illumination in electron microscopy. Professor Richard S. Bear's X-ray diffraction research was aided by the addition of new X-ray and photometric equipment. With Orvil E. A. Bolduan he made new advances in the analysis of collagen structure, and with Kenneth J. Pipenberg he studied the structure of starch (aided by a grant from the Corn Industries Research Foundation). Professor John R. Loofbourow and associates, under a grant from the American Cancer Society, designed achromatic optics which should greatly extend the usefulness of ultraviolet microscopy and microabsorption spectroscopy in biological research. They also continued their analysis of substances released by cell damage.

Research on proteins and enzymes is a major aspect of the Department's program. The purchase of an electrophoresis apparatus and an analytical ultracentrifuge greatly augmented the physical chemical instrumentation. These units will be installed shortly. Professor David F. Waugh, with the aid of a grant from Armour and Company, extended his analysis of the reversible molecule-to-fiber transformation of insulin. Professor Irwin W. Sizer demonstrated the ability of enzymes and reagents to oxidize certain proteins and determined the amino acids involved in the reaction. Torsti P. Salo made biochemical analyses on collagen and hydrolytic products. Professor H. Stanley Bennett's efforts have been devoted chiefly to the development of analytical cytological methods for the further elucidation of cell structure and function. Professor Bernard S. Gould completed a study of the role of the enzyme phosphatase in wound healing and in scurvy. He also investigated

the influence of ascorbic acid on bacterial fermentation. Professor George T. Johnson's work on the cytogenetics of yeast and the effects of carcinogenic compounds on the growth of microorganisms is under way. Professor Charles H. Blake continued his study of the coloration and flight of birds.

Professor Kurt S. Lion completed his study on high-frequency gas discharge and the effect of short electric waves in diathermy and is studying certain new electroencephalographic effects.

The accommodation of the present numbers of graduate and postdoctoral students is made difficult by stringent space limitations. The most serious need of the Department is for adequate space to permit the full realization of its research and teaching programs.

FRANCIS O. SCHMITT

CHEMISTRY

The 1946–1947 academic year marked the completion of the major program of remodeling the laboratories of the Department This program began in 1943. The Department now has excellent facilities for laboratory instruction in each of the four undergraduate years, and for research.

An important change in undergraduate teaching was the reorganization of first-year chemistry by the large staff concerned with that subject, headed by Professor James A. Beattie. New staff teaching assignments, undertaken with the object of increasing simultaneously the quality and quantity of undergraduate teaching, included the following: lectures in first-year chemistry: Professors James A. Beattie, Clark C. Stephenson, and Walter H. Stockmayer; second-year analytical chemistry: Professor Ralph C. Young (transferred from first year chemistry); third-year organic chemistry: Professor William M. Hearon; third- and fourth-year organic chemistry: Professors John D. Roberts and John C. Sheehan; third-year physical chemistry: Professor Richard C. Lord, Jr.; fourth-year inorganic chemistry: Professors Charles D. Coryell and John W. Irvine, Jr. These men reinforced others on the staff responsible for teaching these subjects. Ninety per cent of the Chemistry

Department staff now participates in some phase of undergraduate instruction.

Changes planned for the 1947–1948 academic year include addition of a senior subject in instrumental analysis, to be taught by Professor David N. Hume, newly appointed to the staff in analytical chemistry, and the addition of an elective term of theoretical organic chemistry, to be taught by C. Gardner Swain, also a new appointee. Professors Stockmayer and Lord will be concerned with modifications of third- and fourth-year physical chemistry subjects, respectively.

In the Graduate School, the first of the qualifying examinations which now are required early in the programs of all Ph.D. candidates was given in September, 1947. The examinations are designed to insure that all doctoral candidates have an adequate background in each of the four major fields of chemistry before they proceed to the specialization of advanced graduate work.

Research continued at a high level of activity, with participation by most of the record number of 140 graduate students. The many and varied research programs, too numerous to name here, are reflected in staff publications during the year, which are listed beginning on page 294.

ARTHUR C. COPE

FOOD TECHNOLOGY

From December, 1946, to June, 1947, the Department was in the process of moving to new quarters in Building 20. Enlarged facilities are now available for carrying on the work in Industrial Microbiology, Biochemistry of Nutrition, and Food Technology as an integrated group.

The cooperation of the American Can Company, Standard Brands, Inc., Nestle's Milk Products, Inc., Wilson and Company, Pillsbury Mills, and Dow Chemical Company in our main research work was continued. Cooperative work in the use of the Spectroscopic Laboratories in connection with our studies in food technology was carried on with the aid of the Continental Can Company and the Hartford Empire Company.

Equipment was loaned to the Department by the Induc-

tion Heating Corporation of New York and the Raytheon Manufacturing Company of Waltham for research on the effects of electronics on foods. The Department also continued to have the use of the sonic laboratories of the Submarine Signal Division of the Raytheon Company.

In conjunction with the Department of Electrical Engineering, a study has been in progress on the use, in food processing, of X-rays and cathode rays produced at high voltages.

A laboratory for research in flavor problems was established during the year. At present the program is limited to studies on the relationship between taste and the chemical and physical properties of pure compounds, the isolation and identification of chemical compounds that contribute to food flavor, and the development of a flavor panel for analysis of the factors governing food acceptance. An attempt is being made to gain a better insight into the relationship between subjective and objective methods for measuring flavor and changes in flavor from the standpoints both of processing and of storage.

In December, 1946, a research was initiated on packaging materials for food products, a research directed toward the goal of finding the packaging requirements of raw and processed foods.

A microbiological survey was made on commercially frozen precooked foods from fifteen different states. Both numbers and types of microorganisms in these products were determined. The growth of pathogenic microorganisms while these foods are thawing was studied, and a bacteriological food spoilage indicator was devised to warn the consumer of frozen foods which have been allowed to thaw. The problem of identifying large numbers of bacterial cultures was simplified by an automatic multiple inoculation technique and apparatus devised to facilitate the transfer of bacterial cultures.

The work on dehydration centered on eggs, with an effort to evaluate the various methods used in checking the quality of the resulting product. The factors that materially affect keeping qualities of dried eggs were also studied.

Studies were conducted on other food technology problems, such as the fractionation of vegetable oils, the refining of maple syrup by ion exchange, the analysis of the composition of

orange oil, and the determination of the tocopherol content of some food plant by-products and vegetable oils. An attempt is also being made to improve the technique of mold count in tomato products.

The Nutritional Biochemistry Laboratories continued their research program on: (a) the metabolism of deuteriumated fatty acids, (b) the composition of Central American foods, (c) the nutritional advantage of concurrent feeding of essential amino acids, (d) the cause and prevention of browning of ascorbic acid, (e) the effect of phytates on absorption of radioactive iron, (f) the stability of ascorbic acid in stored food samples, (g) the nutritional interrelationship between pyridoxine and essential fatty acids, and (h) the effect of dietary fat upon nitrogen retention. Partial support of this program was given by unrestricted funds generously supplied by the Nutrition Foundation, Charles H. Hood Dairy Foundation, Quaker Oats Company, National Live Stock and Meat Board, Swift and Company, Inc., and United Fruit Company. During the first year of the planned three-year study of the nutrient contents of the food plants of Central America, 164 plant species or varieties were collected and received at the laboratory. Many of these plants had not been analyzed before, and a number were found to be surprisingly nutritious. Data on the composition of indigenous plant foods are of basic importance to a practical solution of the food and nutrition problems of any nation. Professor Robert S. Harris, who is in charge of this work, continued to act as consultant for the Institute of Nutrition of Central America and Panama.

The Department is appreciative of the continued cooperation received from the Departments of Electrical Engineering, Mechanical Engineering, Chemical Engineering, Chemistry, Physics, and Biology at the Institute. This cooperation has not only aided greatly the progress toward the solution of our research problems but has also been of help in the instruction of our undergraduate and graduate students.

Cecil G. Dunn was promoted to associate professor of industrial biology.

The northeast section of the Institute of Food Technologists was host in Boston in June for the institute's seventh

annual conference. It was fitting that this conference should take place on the tenth anniversary of the first food technology conference, which was held at M. I. T. under the guidance of Dean Samuel C. Prescott and out of which has grown the national Institute of Food Technologists. Dean Prescott was chairman of the local arrangements committee for the seventh conference, Professor Bernard E. Proctor was chairman of the budget and general coordinating committee, and other members of the Department served on various subcommittees. Dean George R. Harrison was the banquet speaker at this conference and gave a stimulating address on "New Advances in Science."

WILLIAM L. CAMPBELL

GEOLOGY

The Department has now become adjusted to its new quarters in Building 24. Research, service, and instructional laboratories in spectroscopy, X-ray crystallography, radioactivity of rocks and minerals, and geochemistry of organic compounds subjected to bombardment have been moved to thoroughly modernized quarters where much new equipment has been installed. A new research laboratory has been established for study of the behavior of rocks and minerals under high pressures. These modern laboratory facilities have not only attracted graduate students to the Department but have also brought four distinguished guest scientists who spent time in the Department during the year acquiring new techniques and conducting researches.

Graduate student enrollment during the past year closely approached the Department's quota, and undergraduate enrollment showed promising improvement. Graduate student enrollment for the coming year has already slightly exceeded the Department's quota, and undergraduate enrollment will be the highest in many years.

The only change in the department staff has been the appointment of James B. Thompson, Jr., as instructor in Geology.

Research activities supported by funds from outside the Institute are as follows: (1) A project involving the study of the behavior of rock and mineral material under controlled

pressure, temperature, and solution environments, under the direction of Professor Harold W. Fairbairn, is supported by a grant of $15,000 from the Penrose Fund of the Geological Society of America. This is a continuing project and the past year was its second. (2) Investigation of the relationship of radioactivity to the origin of petroleum is in progress under the direction of Professor Walter L. Whitehead, financed by a grant for the year of $11,700 from the American Petroleum Institute. This is a continuing project and has completed its fifth year. Three publications reporting results appeared last year, and members of the staff participated in the symposium on radiation chemistry at the University of Notre Dame in June. (3) Closely related to this project is a second investigation under the direction of Professor Whitehead for the measurement of variation of radioactivity of selected geological formations from important oil fields. This work, supported by a grant of $2,500 from the Penrose Fund of the Geological Society of America, involved the cooperation of several of the large oil companies. (4) Investigation of the age of rocks and minerals by measurement of products of radioactive decay was continued under the direction of Professor Patrick M. Hurley, financed by a grant of $6,800 from the Penrose Fund of the Geological Society of America. Professor Hurley, serving as chairman of the subcommittee on radiogeology of the National Research Council's committee on nuclear science, has been actively engaged in developing radiogeology as a tool for geological investigation.

During the past academic year, Professor Martin J. Buerger and his students determined the arrangement of atoms in the minerals cubanite and nepheline as well as in the organic compound diglycine hydrobromide. They also revised the crystallographic status of the minerals pyrrhotite and kermesite. Professor Buerger made contributions to the crystallographic nature of phase transformations and to the interpretation of X-ray diffraction data. He also served as president of the Mineralogical Society of America during 1947. Professor Robert R. Shrock completed a new textbook on "Sequence in Layered Rocks," which will be published late in 1947.

WARREN J. MEAD

Mathematics

Registration in Mathematics continued to increase, reaching 106 sections in the first term. This included twenty-three sections of graduate A work and about 55 per cent of all the students at the Institute. The graduate courses offered by the Department were extended and completely reorganized to include specialties of new staff members and to cover more adequately the expanding needs of the Institute.

During the fall term Professor Eric Reissner had charge of a colloquium in applied mathematics which was concerned with current work in fluid mechanics. Speakers and students came from Harvard and Brown universities and from the Departments of Mathematics, Mechanical Engineering, and Aeronautical Engineering at the Institute. Attendance was unusually large for such an advanced topic and continued large throughout the series of lectures. To strengthen further our work in fluid mechanics and its underlying mathematics, Professor C. C. Lin of Brown University was appointed associate professor of mathematics.

The Mathematical Statistics Laboratory continued work for the Army Air Forces on the prediction mechanism in long-range weather forecasting and investigated for the American Transit Association the factors which influence transit riding. Professor George P. Wadsworth, who is in charge of the work in mathematical statistics, became project director for the Operations Evaluation Group assigned to the Office of the Chief of Naval Operations.

One of the activities of the Department for the last twenty-six years has been the publication of the *Journal of Mathematics and Physics*. Until recently this journal accepted articles on all fields of mathematics and physics, a majority of the articles coming from members of the Institute staff. Last year the decision was made that the usefulness of the journal in present circumstances would be increased by greater specialization. The journal therefore now serves "for the publication of mathematical papers from the fields of engineering and applied physics, and for the publication of mathematical methods and results of interest for the applications." The effect of this

specialization has been much wider distribution of the journal than heretofore.

In June, Professors Norbert Wiener and Raphael Salem attended the Paris Conference on Harmonic Analysis, Professor Wiener giving one of the invited addresses. Professor Norman Levinson was made a member of the committee on applied mathematics of the National Research Council. Professor Wadsworth received from the War Department a citation for achievement as special consultant to the Army Air Service.

Professor William T. Martin has been made head of the Department, succeeding Professor Henry B. Phillips, who retired as professor emeritus on July 1. Professor Martin came to the Department as instructor in 1936. From 1940 to 1941 he was on leave of absence as research associate in mathematics at Princeton University, and from 1943 to 1946 he was professor and chairman of the department of mathematics at Syracuse University. In September, 1946, Dr. Martin returned to the Institute as professor of mathematics and executive officer of the Department.

HENRY B. PHILLIPS

PHYSICS

The year in the Physics Department, as in the rest of the Institute, was one of starting the large-scale teaching of returned veterans and other students whose academic careers had been interrupted by the war. The Department instructs not only the increased number of first- and second-year students in the Institute as a whole and the greatly increased numbers in the undergraduate and graduate years of Course VIII, but also many more students than before the war from other departments, who are interested in such advanced undergraduate and graduate fields as electronics and nuclear science.

Several developments which had been planned in the preceding year or two made it possible to carry this teaching load. First among them is the group of new undergraduate laboratories in Building 4, both for first-year instruction and for the third and fourth years of Course VIII. These laboratories were completed, equipped, and occupied during the year. They have

fulfilled every expectation in the way of improving laboratory instruction, and with further gradual development they should take care of the even greater numbers of third- and fourth-year students whom we expect in a year or two more. The Department is very grateful to the administration for making the laboratory development possible, and to the Superintendent of Buildings and Power for the difficult task of carrying out the construction in the face of current shortages of materials.

The second development which helped in carrying the teaching load has been the establishment of the Research Laboratory of Electronics, the Laboratory for Nuclear Science and Engineering, and the Acoustics Laboratory, about which I reported in detail a year ago. These laboratories, with their unparalleled equipment, their able administration, their generous financing, their trained technicians, and their adequate though largely temporary quarters, make possible a much greater program of research than we could otherwise handle and consequently allow us, without undue burden on the professors, to take care of the large number of graduate students who wish to be trained in physics. At the same time, these laboratories have helped the permanent staff members to get back to research problems after the interruption of the war. The separate reports of these laboratories, included in the President's Report this year for the first time, list many research projects in which members of the Department are concerned.

The third development of assistance in teaching has been the large group of able research associates whom I mentioned in my report last year. These young men are not only contributing in a most valuable way to the research laboratories by their presence while they finish their graduate work, but at the same time they furnish a reservoir of trained and enthusiastic physicists from whom teachers can be drawn to supplement the members of the permanent instructing staff and the teaching fellows. The research associates have carried very light teaching loads, and it has not been necessary to call on all of them in any one term. Nevertheless, they have been able to carry enough of the teaching so that we have handled the large amount of elementary instruction without burdening

anyone unduly, and at the same time they have been obtaining teaching experience which they have in almost every case been very glad to get. The first group of these predoctoral research associates are taking their doctor's degrees as the year ends, and many more will finish during the coming year. We look forward to a rapid decrease in the category of predoctoral research associates in the next few years and a corresponding increase of predoctoral research assistants (half time) and of postdoctoral research associates. The predoctoral research associates were regarded as a temporary expedient to meet a temporary need, which will soon pass.

Considerable interest was aroused in a number of departments by the Seminar in Nuclear Engineering, conducted during both terms under the direction of Professor Clark Goodman. This seminar formed one of the first expositions of the principles and design of chain-reacting piles intended for undergraduate and graduate students. Its content was checked carefully beforehand by the Atomic Energy Commission, and the lecture notes are to be published as a book.

Professors Philip M. Morse and M. Stanley Livingston are on leave of absence to the Brookhaven National Laboratory, Professor Morse as director and Professor Livingston in charge of the design of electronuclear machines. Professor Livingston visited England in the early summer of 1947 in connection with this project, studying particularly the projected proton-synchrotron at the University of Birmingham. Professor Robley D. Evans visited England during June under the auspices of the British Medical Research Council and the British Atomic Energy Commission, conferring and lecturing on the medical and biological applications of nuclear physics.

JOHN C. SLATER

SCHOOL OF ARCHITECTURE AND PLANNING

Architecture

Staff recruitment and reorganization are now completed, commensurate with the planned enrollment of undergraduate and graduate students, and the Department is proceeding in its postwar orientation. One of the tasks of the year has been the preparation of a bulletin, conceived primarily as a report to Alumni on the present objectives and opportunities of the School of Architecture and Planning. This bulletin also reviews the history of architectural education at the Institute and summarizes the influences that have shaped it. In working on this document the staff had an opportunity for stocktaking which is beneficial in view of future tasks.

The series of conferences to celebrate the Princeton University bicentennial included, in March, a conference on "Planning Man's Physical Environment." Among the fifty participating architects and planners were five from Technology, including Dean William W. Wurster, Professor Alvar H. H. Aalto, and Professor Gyorgy Kepes of this Department, Professor Frederick J. Adams of the Department of City and Regional Planning, and John E. Burchard, Director of Libraries.

Vernon DeMars was added to the staff as visiting professor of architecture during the year and he joins the panel of design teachers, alternating with Professor Aalto. Professor DeMars has done important work in public housing, in particular for the Farm Security Administration in California. A number of distinguished visitors came to meet our staff and to give lectures for the students: Sigfried Giedion, Lewis Mumford, Antonin Raymond, Roland Wank, and Ernest Kump.

The annual meeting of the Association of Collegiate Schools of Architecture was participated in by Dean Wurster, and both he and Professor Carl Koch took part in the annual convention of the American Institute of Architects. Dean Wurster also served on the committee of awards for the competition sponsored by *Progressive Architecture.* Professor Herbert L. Beckwith was a member of the National Architectural Accrediting Board for accrediting instruction at Pratt Institute and Rensselaer Polytechnic Institute. He also con-

tinues his activity for the Committee on the Technology Museum and has advised other departments in regard to space changes. In cooperation with Professor Parry Moon and Carl M. F. Peterson, Superintendent of Buildings and Power, Professor Beckwith has been working on improved methods of artificial lighting suitable for future use in Institute installations.

The Department continues its participation in two joint projects: Solar Energy Conversion and the Acoustics Laboratory. Professor Lawrence B. Anderson is chairman of a subcommittee concerned with the utilization of solar energy for house heating; the study is made possible by the Godfrey L. Cabot bequest administered by the Committee on Solar Energy Conversion. Edmund L. Czapek has been appointed research associate to assist in this project. The past heating season was spent in the instrumentation of the new laboratory and in developing methods of measurement to be used during the coming season. The Department has used the facilities of the Acoustics Laboratory for instruction of Course IV-A and other students at the graduate level, in a study to develop the design of an experimental broadcast and recording studio now under construction in the Acoustics Laboratory. Such a collaboration, though usual among other departments, is a new activity in architectural education, and it is hoped that it may provide a means of exploring fields where development is needed to improve architectural techniques.

LAWRENCE B. ANDERSON

CITY AND REGIONAL PLANNING

The Executive Committee of the Corporation on February 6, 1947, authorized the setting up of the Department of Architecture and the Department of City and Regional Planning in the School of Architecture and Planning. Since 1933, City Planning had been a division within the School of Architecture, so that a significant step has been taken in the creation in the School of two coequal Departments.

Increases in instructing staff have kept pace with an enrollment that has more than doubled since prewar days.

Recent appointments to the staff include Burnham Kelly and Arthur D. McVoy as assistant professors of city planning, and Lloyd Rodwin as assistant professor of land economics. Homer Hoyt has retired from his position as part-time associate professor of land economics. In June the Committee on the Graduate School authorized an increase in graduate students in the Department from twenty to twenty-five, which still does not permit the admission of all qualified applicants. This number, however, when added to the anticipated undergraduate enrollment, is as high as can be handled satisfactorily within the limits of staff and space.

Professor Frederick J. Adams attended the International Congress on Housing and Town Planning held at Hastings, England, in October, 1946, as one of twelve official delegates from the United States appointed by President Truman. At the annual meeting of the American Institute of Planners in January, Professor Adams was re-elected vice president; Professor Draveaux Bender was reappointed executive secretary; and Professor Roland B. Greeley was reappointed managing editor of the *Journal* and chairman of the program committee of the institute, which is the national professional society of city and regional planners. Professor Adams was also elected in May a member of the board of directors of the American Society of Planning Officials.

Former students of the Department continue to make an impressive record in public service, graduates of the last ten years holding the top staff positions in a number of cities, including Cleveland, Ohio; San Francisco, California; Grand Rapids, Michigan; Lima, Peru; and Manila, Philippine Islands. Graduates of Course IV-B also head the city planning departments at Cornell University, the University of North Carolina, and the University of Denver.

The problem of finding sufficient trained personnel in city and regional planning is still one of the most serious facing the profession, and the Department of City and Regional Planning at M. I. T. recognizes its responsibility in providing leadership in the setting of standards of instruction.

FREDERICK J. ADAMS

Albert Farwell Bemis Foundation

The major efforts of the Foundation during the past year have centered in two surveys which it has initiated — in the fields of prefabrication and of group dynamics.

To supplement the mass of data accumulated in the files of the Foundation as the result of correspondence with prefabricators and manufacturers of housing, the Foundation added to its staff Herbert S. Heavenrich, Jr., an engineer with a specialized background in this field. He spent a good part of the year visiting major housing plants throughout the country, and he is now directing the analysis of this material and the preparation of reports.

The Research Center for Group Dynamics continued its study of the psychological factors involved in housing, first in Westgate, the housing project built by the Institute for its married veterans, and then in a project in Weymouth, Massachusetts, selected to provide a basis for comparison. This study was initiated by the Foundation for the purpose of exploring the possibility of collecting specific data bearing on the planning and construction of houses and housing developments through the tested techniques of modern group dynamics. Additional funds have been obtained by the Research Center to carry the work further and to make a general study of the effects of social organization on tenant satisfaction in housing developments. It is expected that reports on various phases of this work will be available in the near future.

In addition to these surveys, the Foundation has made its technical services available to the sponsors of an important law recently passed in Massachusetts, making it possible for the manufacturers of new building materials and the developers of new construction systems, after submitting to a single careful test, to sell their products throughout the Commonwealth with a minimum of interference from outdated building codes. The possible benefits to the public, through both better housing and lower costs, make legislation of this sort particularly significant.

From time to time, the Foundation staff assists in seminars given by the School of Architecture and Planning, and it continues to make its facilities available to a number of visitors,

from housing organizations, industrial producers, and the like. Foreign relations make up an important part of this service, the countries represented in recent months by visitors to the Foundation including Great Britain, Peru, New Zealand, Australia, Norway, Finland, and Denmark.

JOHN E. BURCHARD

DIVISION OF HUMANITIES

Economics and Social Science

Last year's report referred to the establishment of Course XIV — a new four-year undergraduate curriculum in Economics and Engineering. At the beginning of the fall term, 1947, there will be more than sixty students enrolled in this program. In the combined five-year course, about twenty students are planning to carry on to the master's degree in Economics and Engineering. Thus the Department is playing an increasing role in the educational activities of the Institute.

In the third year of the humanities program, second term, in which the Department offers a choice of three electives, the enrollment is running as follows: Labor Relations, 45 per cent; Introductory Psychology, 30 per cent; Industrial Economics, 25 per cent. This division is no doubt attributable to current public interest in employer-employee relations. The popularity of International Relations — which is our contribution to the humanities electives in the fourth year — stems from a widespread concern about the development of American foreign policy.

Professor Norman J. Padelford and his associates are publishing a series of "Current Readings in International Relations," which have proved useful in class instruction. Three have been issued so far, and are being used by more than twenty-five other colleges and universities. These readings have been made possible by a grant from the Rockefeller Foundation. Another valuable aid in carrying out our part of the humanities program is the new text and casebook on personnel administration by Professors Charles A. Myers and Paul Pigors.

The Industrial Relations Section has concentrated on restoring our graduate program, which withered away during the war. About eighteen students are now enrolled for professional training in industrial relations at the graduate level. Professors Charles A. Myers and Douglass V. Brown are working on an eighteen months' study of labor-management relations for the Committee for Economic Development. Other

members of the section have been engaged in labor arbitration activities and in preparing papers for industrial relations conferences being held in various parts of the country. The section continues to receive strong support from industry, and several firms have donated scholarships for graduate study. Professor Douglas M. McGregor has prepared a special memorandum — the tenth annual report of the Industrial Relations Section.

Professor Richard M. Bissell, Jr., has been studying the problem of the guaranteed annual wage for the United States Steel Corporation, and Professor Paul A. Samuelson has helped write a significant report to the President on the same subject. The former has been in Washington assisting in the preparation of the Marshall plan for European aid. Professor Harold A. Freeman, who is in charge of instruction in statistics, is carrying on research in multiple machine interference and in the determination of business inventory policy. Professor W. Rupert Maclaurin and his associates, working in the field of technological change, have completed their investigations into the paper and radio industries. Studies in the glass container and incandescent and fluorescent lighting industries are in their final stages.

The Research Center for Group Dynamics has been working on a major research program under a contract with the Office of Naval Research. The center has also continued its researches into the origins and effects of prejudice in intergroup relations. These activities are being carried on in cooperation with the Commission on Community Interrelations and the Bureau for Intercultural Education. Because of Kurt Lewin's death, the Institute has reluctantly decided to discontinue this center, which has done a distinctive job in a basic and significant field of social investigation. It will therefore be discontinued on June 30, 1948.

RALPH E. FREEMAN

ENGLISH AND HISTORY

The Department welcomed the return of Professors Robert S. Woodbury from his several years of service in the Navy. It was with regret that we received the resignations of Professor

Theodore Smith, who left to take a position with the Moving Picture Producers of America, and of Professor Paul C. Eaton, who has joined the faculty at California Institute of Technology. Twelve new instructors joined the Department. Counseled by the older members, they adjusted themselves very quickly to the special problems of teaching English and history in an engineering college. As a result, we were able to keep the quality of our instruction at a high level.

A year's experience with a new sophomore option, Intellectual Problems of Democracy (now known as the Growth of Democratic Thought), indicates that it is a worth-while addition to the Department's program. Approximately 40 per cent of the class elected it in place of the option, the United States in World History. The new subject appeals especially to students who have had good introductory courses in history at secondary schools and to students who enjoy studying the origin and influence of ideas.

As part of the new humanities program, the three fourth-year options — History of Ideas; Books and Men; and Introduction to Music — had a successful first year. Although the enrollments have not been large except in Music (156 in History of Ideas, 119 in Books and Men, and 262 in Introduction to Music), the interest of the students and their willingness to do large amounts of difficult reading have been very gratifying.

One of the most interesting experiments the Department has tried in teaching literature has been conducted by Theodore Wood, Jr. At the request of a group of seven sophomore veterans who desired more knowledge of good literature, he began a program of extracurricular reading with them. Within a few weeks more than sixty students had asked to join the group. Mr. Wood divided them into eight small groups according to their backgrounds and interests in literature and met with each group once a week for discussion. Students may drop the program at any time, but they receive no credit toward their degrees unless they continue it through four semesters. The Department hopes to be able to expand this type of instruction. Although it places a heavy burden on the staff, it gives the student time for wide reading and for thought on what he has read.

Another innovation resulted from the request of two candidates for the doctorate in Chemical Engineering to be allowed to take their minors in this Department. With the approval of the Committee on the Graduate School, one student will complete his minor in the history of ideas, and the other student will complete his in literature.

Professor William C. Greene devoted a great deal of time to adapting and recording some of the Dialogues of Plato and several Greek plays for broadcasting by the Lowell Institute Cooperative Broadcasting Council. Professor Lynwood S. Bryant prepared a very useful volume of readings for the freshman course in composition. He has also served as editorial consultant to the Servomechanisms Laboratory.

Professors John B. Rae and Thomas H. D. Mahoney prepared a history text which will be used in planographed form in the sophomore option, the United States in World History. Professor Howard R. Bartlett presented a paper at a joint meeting of the English and Humanistic-Social divisions of the American Society for Engineering Education during the annual meeting of the society at Minneapolis. He was elected chairman of the English division for the coming year. Professor Karl W. Deutsch presented a paper at the annual Conference on Science, Philosophy and Religion in Their Relation to the Democratic Way of Life. David A. Dudley conducted regular weekly programs for the student radio station WMIT.

HOWARD R. BARTLETT

MODERN LANGUAGES

The year saw the crystallization of the philosophy and methods of the Department's new scientific language courses for graduate students. In one semester graduate students can attain a "reading knowledge" of German, French, or Russian sufficient to enable them to read the technical work in their own fields with the aid of a dictionary. The experimental period can be said to be over, and the Committee on the Graduate School has approved the continuance of the courses on a regular basis. The graduate course in French was given twice, with a total of 155 students; German and Russian were given once

each, with 145 and 10 students, respectively. More than 90 per cent passed their reading knowledge examinations. Fifty doctoral candidates took two different languages in one year.

The increased number of undergraduates at the Institute was reflected in the enrollment in undergraduate courses. Maximum numbers, however, will not be reached until 1947–1948, for language is studied at the Institute almost exclusively by men in their second year. German continues to be the subject in which the greatest interest is shown, with Russian in second place, and French third. About a dozen men attempted the course in spoken Spanish which is making successful use of methods developed during the war, utilizing phonograph records for pronunciation and new types of textbooks in which the speech of South America is taught.

The Department's recording and play-back equipment, available to language students and other interested persons at the Institute, was augmented by a wire recorder borrowed from the President's Office. This has become our most popular piece of equipment, as it provides an immediate and faithful reproduction of the student's voice. It is used mainly in conjunction with a play back. The student listens to one of the Army language records, which are designed so that the instructor on the record pronounces a word or phrase and then pauses long enough for the student to repeat it. The wire recorder, picking up both the instructor's voice from the play back and the student's voice, allows the student, when he replays the wire, to make an objective comparison. He can listen as many times as he wishes and make new recordings, incorporating corrections of those features which his ear tells him to be imperfect. At the end of the year a new model wire recorder was purchased by the Department as a permanent addition to its mechanical equipment.

It is with sincere regret that the Department announces the retirement of Herman R. Kurrelmeyer from active teaching after forty-five years of service at the Institute, the last two as honorary lecturer. Professor Kurrelmeyer will continue as professor emeritus, but those thousands of students and alumni who have known him as teacher and friend will regret with the

staff of the Department that his days of classroom teaching have come to an end. Other changes in the Department include the promotion to the rank of assistant professor of Fritjof A. Raven, who came to us at the beginning of the year. We added to our staff Donald T. Kyte as part-time instructor in German.

WILLIAM N. LOCKE

INTERDEPARTMENTAL LABORATORIES

Acoustics Laboratory

The Acoustics Laboratory was established in January, 1946, under the joint sponsorship of the Departments of Architecture, Electrical Engineering, and Physics. The Laboratory is administered through the Dean of Engineering by a supervisory committee composed of Professor Richard H. Bolt, Department of Physics, Director; Professor Leo L. Beranek, Department of Electrical Engineering, Technical Director; Professor Lawrence B. Anderson, Department of Architecture; Professor Richard D. Fay, Department of Electrical Engineering; Professor Philip M. Morse, Department of Physics (on leave of absence); and Professor Julius A. Stratton, Research Laboratory of Electronics.

During the past year the objectives have crystallized and the program has been defined and implemented to a considerable extent. The general objectives are: (1) to offer fundamental training in the research and engineering methods of acoustics, supplementing courses offered by the Departments; (2) to provide for staff members and students basic research facilities and guidance in research activities in acoustics and related fields; and (3) to maintain close relations with the applied fields of acoustics, in order to point research activities in directions likely to prove useful to government and industry.

The Laboratory has operated under an appropriation from the Institute for initial equipment and for annual expenditures, and under a contract with the Bureau of Ships, United States Navy, administered through the Division of Industrial Coöperation.

The research activities represent diverse attempts to investigate the behaviour of sound fields in different media, the influence of boundaries on such fields, and the integration of sound fields and boundaries with characteristics of hearing and of instruments and with the design of rooms. New facilities acquired and developed during the year include a dead-wall tank for sound-field studies and impedance measurements in air and water; a precision impedance tube for measuring the characteristics of acoustic materials in air; a tube for conduct-

ing similar measurements in water; and a new experimental studio of flexible design, for full-scale realistic studies in room acoustics, audio communications, and architectural design. There is an urgent unfilled need for a sound diffusion room and dead room, intended for transmission studies and calibration purposes.

The Laboratory, consolidated in a wing of Building 20, occupies about 12,000 square feet. Some sixty persons are at present connected with the Laboratory, many of them spending but a fraction of their time. The equivalent full-time personnel numbers about thirty-five. During the year the number of graduate students engaged in Laboratory activities increased from nine to nineteen. They include students registered under a newly established acoustics quota of eight candidates for the M. S. degree without department specification, in addition to students from the sponsoring Departments. This extent of student participation is particularly gratifying in view of the continuing national shortage of men adequately trained in acoustics.

RICHARD H. BOLT

RESEARCH LABORATORY OF ELECTRONICS

In the President's Report for the year 1946, accounts were given by Professors John C. Slater and Harold L. Hazen of the circumstances leading to the organization of the Research Laboratory of Electronics. The scope and plan of such a laboratory as a joint enterprise of the Departments of Physics and Electrical Engineering were conceived by Professor Slater before the termination of the war and, thanks to his initiative and the cordial support of Professor Hazen, the Institute was prepared to capitalize in an extremely effective manner on the opportunities afforded by the liquidation of the Radiation Laboratory following the close of hostilities.

During the first six months of 1946 the Research Laboratory of Electronics administered a program of basic research under the auspices of Division 14 of the National Defense Research Council. On July 1, 1946, all association with the N.D.R.C. came to an end, and the Laboratory became an

integral part of the Institute, placing at the disposal of our students and staff facilities for the advancement of knowledge in the field of electronics which are probably unequaled in any other educational institution.

The opening of our second fiscal year finds the Laboratory operating smoothly, with the many difficult problems of the transition period well behind. Physically the Laboratory occupies approximately 32,000 square feet in Wing A of Building 20, a temporary structure erected during the war for the use of the Radiation Laboratory. An additional 5,000 square feet are devoted to the radar and intelligence section of Project Meteor, a development of guidance systems in connection with the M. I. T. guided missiles program, and there is an associated document room containing reports amassed by the Radiation Laboratory. Although our present housing leaves much to be desired, the Laboratory is extraordinarily fortunate in the provision of materials and equipment for instruction and research.

At this period when the demands of industry and government agencies for specialized skills and facilities are numerous and persistent, there is a sore temptation to expand the activities of the Laboratory beyond their present scope. This temptation will be resisted. Additional projects, particularly those calling for the development of specific products or devices, can be undertaken only by an expansion of the supervisory staff beyond the normal needs of M. I. T. as an academic institution. The basic policy of the Laboratory is governed by the concept of the Institute devoted primarily to instruction and research of a fundamental character. It is only on such grounds that our Research Laboratory of Electronics can justly claim to supplement and support the research and development activities of industry and government and confidently solicit their continued financial aid.

Accordingly, the activities of the Laboratory are directed by members of the Institute's academic staff holding normal appointments in the Departments of Physics and Electrical Engineering. To these, Electrical Engineering contributed thirteen of assistant professor rank or higher (including those associated with Project Meteor), while sixteen were drawn from Physics. Mathematics is also represented directly through the

association of Professor Henry Wallman. The joint character of the Laboratory is further apparent from the eighty-three graduate students engaged on the various research projects, thirty-nine of whom are candidates for degrees in Physics, forty-three for degrees in Electrical Engineering, and one for a degree in Mathematics. Twelve of these graduate students are engaged in research on Project Meteor. The majority of these students receive financial aid through fellowships or appointments as research assistants and research associates.

A notable feature of contemporary electronic development is the growing complexity of circuits and circuit components. The professor who divides his time between the classroom and the laboratory is gravely handicapped in the pursuit of significant knowledge if he himself is burdened with the enormous task of wiring and testing equipment preparatory to almost every crucial experiment. A cursory inspection of the chassis of any radio receiver will make this point clear. Pooling of resources for electronic research at the Institute and the generous support extended by the armed services have enabled us to bring together a group of machinists, technicians, and tube specialists of unusual experience and competence. Working closely with staff and students, they are contributing in splendid fashion to the training of our students in the practical techniques of electronics and to the enormously increased effectiveness of our academic staff.

During the past year the principal financial support of the Laboratory was derived jointly from the Army Signal Corps, the Army Air Forces, and the Office of Naval Research. This was a noteworthy undertaking by the armed services to share in the support of basic research in electronics in the common interest and it is a pleasure to report that this first year was marked by the most excellent relations and understanding on all sides. Funds have now been committed by the services to extend their sponsorship at the present rate until June 30, 1949.

The entire plan of the Laboratory has been formulated with a view to preparing an outstanding group of students and to giving substance to their academic instruction by association with an active program of research. For the healthy development of this plan it is imperative that the present close

and cordial relations with industry be maintained and cultivated. It is our hope that many leaders in industrial electronics will be found among our graduates and that the character of research projects undertaken by the Laboratory will be directly influenced by an intimate knowledge of basic problems confronting the industry. Accordingly, an appeal is being made to leading groups in the electronic industry to share in the financial sponsorship of the program. It is proposed that this sponsorship shall normally take the form of contributions to a pool of graduate fellowships, to be known as Industrial Fellowships in Electronics. Each fellowship represents a grant of $1,200 to $1,500, plus an additional credit of $700 for tuition. Fellows will conduct their studies and research primarily in electronics, but the Institute reserves the right to select the particular problems within this field which are deemed most appropriate from an educational standpoint and from the standpoint of the facilities and personnel available. About 50 per cent of each contribution is reserved for the supporting cost of research. The response from industry to this plan has been most gratifying. Among the present sponsors are the Federal Telecommunication Laboratories of the International Telephone and Telegraph Corporation, the Radio Corporation of America, the Westinghouse Electric Corporation, and the Socony-Vacuum Oil Company, Inc. The General Radio Company has been a staunch friend of the Laboratory, and the Sperry Gyroscope Company has indicated an intention of participating in the immediate future. Several other organizations have expressed an active interest, and it is hoped that the list may be expanded during the coming year.

Reflecting the particular interests of the two parent Departments, our current research projects range from problems of fundamental physics to investigations basic to the electrical communications industry. Somewhat arbitrarily the program is at present classified into five divisions as a matter of convenience, and these are reported here as an indication of the scope of modern electronics and the work of the Laboratory:

I. Microwave and Physical Electronics. Professor Stuart T. Martin is conducting an investigation of high-power magnetrons, primarily to determine the engineering problems limiting

power obtainable at microwave frequencies. Albert S. Eisenstein, who now leaves us to assume an associate professorship at the University of Missouri, has been studying properties of oxide-coated cathodes, and further cathode research has been carried on by graduate students under the guidance of Professor Wayne B. Nottingham. An important contribution to the theory of the new traveling wave tube was made by Professor Lan J. Chu, and experimental work on this tube was supervised by Professor Jerome B. Wiesner.

II. Microwave Physics. Under this heading fall many of the most interesting applications to science of techniques resulting from wartime radar developments. A fine group of graduate students, working with Professor Albert G. Hill, are engaged in a most promising program of spectroscopic studies of gases at microwave frequencies. Closely related is the molecular beam research under Professor Jerrold R. Zacharias, who during the year supervised the construction of a molecular beam apparatus with which measurements have been made of radio-frequency transitions in atomic hydrogen. A direct outgrowth of radar development is the research directed by Professors Sanborn C. Brown and William P. Allis on the properties of low-pressure gas discharges at very high frequencies. The Laboratory is particularly fortunate in possessing two cryostats of the type developed by Professor Samuel C. Collins of the Department of Mechanical Engineering for producing liquid helium. Thanks to this equipment, an exceedingly interesting investigation of superconductivity at microwave frequencies is being directed by Professor John C. Slater, and measurements of sound propagation in liquid helium at a frequency of fifteen megacycles per second were made by Professor Charles F. Squire and John R. Pellam. Professor Francis Bitter has undertaken an extensive program of magnetic nuclear resonance measurements combining the use of sensitive electronic circuits with facilities for the production of low temperatures and high magnetic fields.

III. Modern Electronic Techniques Applied to Physics and Engineering. Our principal project under this heading is the design and construction of a microwave electron accelerator, for which the military services during the year appropriated

$250,000 to be expended over an eighteen-month period. The project is under the direction of Professor John C. Slater and under the immediate supervision of Professor Arthur F. Kip and Winston H. Bostick. It is expected that a twenty-foot model will yield thirty- to forty-million-volt electrons, and the investigation has already revealed much information on the parallel operation of magnetrons and the factors ultimately limiting the size of this type of accelerator.

At the request of the Brookhaven National Laboratory, Professor George G. Harvey carried through to completion a study based on one-fifth scale models of radio-frequency circuits for extremely large frequency-modulated cyclotrons.

Because of available facilities, an ultrasonics research program which otherwise might be found in the Acoustics Laboratory was conducted in the Electronics Laboratory during the past year.

IV. Communications and Related Projects. Members of the Laboratory from the Department of Electrical Engineering worked with their students on a variety of problems basic to electrical communications, including an analysis of the transmission of information, pulse modulation studies, properties of random noise, and studies of stabilized oscillators. Professor Lawrence B. Arguimbau developed an interesting theory of a proposed method for reducing speech distortion due to multipath transmission. Professor Henry J. Zimmermann assumed the direction of the group in Project Meteor working on guidance systems for missiles, and Professor William H. Radford, in connection with the same project, undertook an important study of telemetering methods.

V. Miscellaneous Problems. There is particular interest in Professor Henry Wallman's investigation of an all-electronic high-speed differential analyzer and in the development, under Stanford Goldman, of a method of producing pictorial displays of electrical potential distribution over a surface, such as the human skull. Professor Ernst A. Guillemin, Professor Lan J. Chu, and Manuel V. Cerillo collaborated on the study of transient phenomena in waveguides.

In so far as the amount of published research is a criterion for the effectiveness of the Laboratory, the record for the year is

impressive. Since July 1, 1946, four quarterly reports have appeared and some thirty-four technical reports have been issued and distributed to a list of approximately five hundred. Most technical reports will appear also in condensed form in the usual journals. There have been many letters to the editors of technical journals and we have been well represented in papers presented at meetings of professional societies.

JULIUS A. STRATTON

LABORATORY FOR NUCLEAR SCIENCE AND ENGINEERING

The past year has seen the Laboratory transformed from a state of elementary planning to a condition of a functioning research organization. Some projects are still in a stage of construction, and some plans have undergone considerable modification. Nonetheless, every group in the Laboratory has accomplished positive experimental results. The feasibility of a field station has been thoroughly explored, and steps have been taken to make possible its establishment. Cooperation with the armed services, other governmental agencies, private institutions and industries has been effected.

Physical Plant and Facilities. In arranging the Laboratory in existing buildings and in planning buildings to house nuclear research, we encounter the problem of protecting sensitive measurements involved in work with natural sources of radiation from disturbance by high-energy gamma rays and neutrons emitted by various particle accelerators. For example, a cyclotron emits neutrons in copious quantity, whereas cosmic ray phenomena might appear as a few individual occurrences per day. In addition, the Institute campus presents a particularly difficult problem, since the terrain is incapable of supporting loads necessary to absorb high-energy nuclear radiations. The problem has been solved in part by relocation of certain experiments to sites remote from disturbing sources. The problem has also been the occasion for thorough study in connection with a proposed permanent building. At the close of the past period, the Laboratory operated with projects under way in many buildings on the campus. The synchrotron is being housed, in what is hoped will be a permanent manner, in a

portion of Building 24, modified to provide safe shielding of personnel. Many of the active projects are housed in temporary quarters which must be replaced in the near future.

The Laboratory has established an instrumentation and health monitoring service to furnish personnel with instruments to indicate the extent of exposure to nuclear radiations. A panel of medical consultants was appointed, consisting of physicians prominent in this field.

Financial Arrangements. The operating expenses of the Laboratory have been supported to a large degree by the Office of Naval Research. This bureau entered into a contract with the Institute in 1946 and has furnished us with funds to carry on fundamental research in nuclear science. Under the terms of the contract, operating expenses connected with the work are covered in a flexible and liberal manner. Even some capital expenditures, such as the construction of the synchrotron, are included. However, no major capital expenditures, such as building construction, are permitted. In all other respects, the work to be undertaken with Navy support is selected entirely at the discretion of the Director of the Laboratory and his project leaders, with no dictation by the sponsor as to the exact problem, the means of investigation, or the extent of the problem. In the spring of 1947, several large industries were approached with the object of obtaining capital support, primarily funds for the construction of permanent buildings. Present indications are that some large companies are responding generously, justifying the hope that construction may be started on a permanent laboratory during the 1947–1948 year. The Laboratory has also benefited to some extent from grants obtained from other government agencies and from private funds, but to a lesser degree.

Personnel. The Laboratory is staffed chiefly by members of the academic departments, 30 in number, with 53 graduate students participating in the program. There are, in addition, 35 Division of Industrial Coöperation staff members and 103 nonstaff employees. Ten to twenty undergraduates have been employed occasionally as part-time assistants. This is in keeping with the Laboratory's policy to provide opportunity

for undergraduates to make contact with research methods early in their careers.

Nuclear Science Research. Largely inspired by Professor Victor F. Weisskopf and Professor Herman Feshbach, the Theoretical Group made substantial contributions to the understanding of essentially nuclear processes and to the problems of direct interaction of elementary nuclear and subnuclear particles. Significant contributions were also made to the theory of nuclear fission reactors. This latter example demonstrates already the stimulating effect of the Brookhaven National Laboratory on the staff members of the Institute.

The Theoretical Group has proved abundantly that its work serves to unify the activities of the various experimental groups. In deciding to make a considerable financial outlay for construction of a machine or providing an expensive measuring instrument, one must consider not only feasibility and possibility of success but also one must make an estimate of the importance to science of the possible results. During this initial period of planning and construction, the Theoretical Group has shown its willingness to become involved in all phases of such decisions. Since the Brookhaven National Laboratory is so closely allied to the Laboratory for Nuclear Science and Engineering, many additional decisions were necessary during this period.

Although Professor Bruno B. Rossi did not arrive at the Institute until February, 1946, he and Professor George E. Valley, Jr., have established a working Cosmic Ray Laboratory in record time. No small share of the credit for this is due to the efforts of Malcolm M. Hubbard, who has built up the now extensive facilities of the laboratory, and to the fine group of predoctoral research associates who had worked in the Los Alamos laboratory. Investigation of cosmic ray phenomena at high altitudes was accomplished through the courtesy of the Climax Molybdenum Company at Climax, Colorado, the Army Air Forces in providing the use of a B-29 aircraft, and Harvard University in providing space for balloon launching at its Blue Hills laboratory. Significant results were obtained on the variation of slow meson intensity with altitude, and considerable light was shed on the understanding of primary cosmic

radiation. The cosmic radiation consists of a large number of particles encompassing a tremendous energy spectrum. It has been the guiding principle of the Cosmic Ray Group to make detection apparatus for specific particles of very definite energy. For instance, slow mesons can be picked out by their characteristic short decay time. This property is used to demonstrate that some particular phenomenon may have been initiated by a slow meson. Other particles and particles at other energies can be treated similarly. The most spectacular result of the Cosmic Ray Laboratory has been corroboration of experiments of the Rome Group, which demonstrates the disintegration of the negative mesons and dependence of this phenomenon on the material used for decelerating the mesons.

Our synchrotron was originally designed by Professor Ivan A. Getting to accelerate electrons to an energy of 150,000,000 volts. This value was chosen because at that time published data indicated that mesons could be created in the laboratory by X-rays of this energy. This report was subsequently retracted by the originators, and our plans were thereupon changed to double the original value, with some resulting delays. Labor conditions caused further delay in production of the magnet. The period, however, was well spent by the group in designing and improving auxiliary equipment to be used with the magnet, in designing a novel means of ejecting the electron beam, and in designing detecting devices for high-energy electrons.

The Institute has for several years been in possession of several electrostatic generators of the belt type, generally called Van de Graaff machines, but these instruments are so versatile and so useful for nuclear research that no sooner is one completed than another one is started. During the present period, a generator designed to attain 5,000,000 volts and planned for positive ions as well as electrons was completed to the point that 3,500,000-volt electrons were obtained. Pending improvements in the vacuum tube resulting from the investigations of Professor John G. Trump, work will continue at this energy.

Professor Trump's investigations have extended our experience in the techniques of high-voltage insulation, and

experimental work and design studies have culminated in construction plans for a 12,000,000-volt electrostatic generator. The work of the group has made possible improvements in existing generator operations; for example, a small pressurized generator originally designed for 2,000,000-volt operation successfully withstood almost 4,000,000 volts under electrostatic test. If adequate financial support can be obtained, it is hoped that during the next period a 12,000,000-volt generator may be started in accordance with these designs. The group has also cooperated with hospitals and organized medical bodies in high-voltage therapy and with other groups in experiments upon the effects of radiation on matter.

In common with the experience at many other institutions, we have found that the intensity of our cyclotron, which is under the direction of Professor Robley D. Evans, has increased with time and that the accepted values for safe tolerable radiation dosage for personnel have decreased. The combination of these facts necessitated a major increase in the shielding of our instrument, which was begun and practically completed during the past year. The cyclotron is now being reassembled and it should shortly be in working order, with greatly improved experimental facilities. Isotopes were obtained from the Atomic Energy Commission through the isotope distribution committee, and it is expected that in the future the availability of such materials will free the cyclotron for more physical experimentation. During the past year, a workable technique was perfected for handling and counting carbon 14. The disintegration schemes of many heavy nuclei were investigated and identified by Professor Martin Deutsch. Equipment for use with the emergent beam of the cyclotron was constructed and readied for use with the reassembled cyclotron. Contributions were made to the understanding of quenching of gas discharges in Geiger counters. Medical cooperation of high quality continued to be one of our most important activities.

The program in nuclear chemistry is divided into inorganic nuclear chemistry, under Professors Charles D. Coryell, and John W. Irvine, Jr.; and organic nuclear chemistry, under

Professor John D. Roberts. The first group completed some important work upon the identification of fission products, using isotopes produced in the cyclotron as a means of recognizing the individual products. Isotope exchange reactions in various solutions were also investigated. In nuclear organic chemistry, techniques were developed to permit the substitution of tagged atoms into complex organic compounds.

A program under the direction of Professor Clark Goodman began in June. It covers the investigation of the absorption properties of various materials for gamma rays and neutrons, with the intention that the results of these experiments may be put to the practical use of improving shields against nuclear radiations.

Nuclear Engineering Program. Under the present security regulations, it is not possible for us to carry on experimental work in nuclear engineering, and particularly the techniques of nuclear fission reactors, directly on the campus. Knowledge of this restriction stimulated our interest in helping to establish the Brookhaven National Laboratory, to which the Institute and the Laboratory for Nuclear Science and Engineering have contributed heavily. Professor Lyle B. Borst of the Department of Chemistry is now on leave to Brookhaven and is directing the pile design for that laboratory. Opportunity for our staff and graduate students to obtain access to a working fission pile will be greatly facilitated on the completion of this project. It should be noted that our contribution to Brookhaven National Laboratory has been heavy in the field of nuclear science as well, with Professor M. Stanley Livingston heading the group which is studying the construction of very large nuclear machines.

Instruction for students and staff was advanced by a series of lectures organized by Professor Clark Goodman and sponsored by the Department of Physics, delivered for the most part by members of the Laboratory for Nuclear Science and Engineering. During the year, Professor Edwin R. Gilliland was appointed associate director of the Laboratory to provide stimulus and guidance for the engineering program.

JERROLD R. ZACHARIAS

Cosmic Terrestrial Research

The Laboratory for Cosmic Terrestrial Research at Needham, with its rapidly accumulating records of field intensity measurements, has continued to place emphasis upon the investigation of radio wave propagation as affected by cosmic factors.

The year 1946–1947 was one of unusual solar activity, with indications that the year 1947 will witness the turning point of the sunspot maximum of the current solar cycle. The present period of high sunspot activity has yielded the two largest sunspot groups in sunspot history. The sunspot number for May, 1947, was the highest single monthly mean value recorded since 1778. This extended solar activity has been accompanied by a high degree of ionization of the upper atmosphere in both the Kennelly-Heaviside and the Appleton layers.

Continuous recordings of ionospheric reception are now made of the Bureau of Standards standard frequency signal WWV, Beltsville, Maryland, five, ten, and fifteen megacycles; on XEWW, Mexico City, 9.5 megacycles; and on WBBM, Chicago, 780 kilocycles. In addition, daily recordings have been made of tropospheric reception received from Station W2XMN, 44.1 megacycles, Alpine, New Jersey.

Analysis of field intensity recordings made at the Laboratory has yielded results of extraordinary interest. The usual seasonal change from a summer to winter pattern in the reception of WWV, five megacycles, over the 370-mile path failed to materialize in the winter of 1946–1947. The well-recognized variation represented by high night fields and low day fields characteristic of the summers of 1943, 1944, and 1945 persisted throughout the winter months of 1946–1947. This anomaly may be attributed to the increased ionizing radiation from the sun, which has more than offset the shortening days, and to the greater zenith distance of the sun incident to winter. Since the last sunspot minimum, night fields have increased nearly tenfold whereas day fields have steadily weakened, presumably because of increased absorption through heavy ionization of the lower ionospheric layers at midday.

It is becoming increasingly evident that the study of

recurrent field intensity patterns throughout the solar cycle is an important source of information supplementary to electron densities derived from critical frequencies determined by many ionospheric stations scattered throughout the world. It may be emphasized that the measurement of field intensities from a distant station integrates transmission conditions throughout the entire path of radio wave propagation, whereas ionospheric soundings, giving critical frequencies, yield chiefly layer heights and electronic densities at a level of maximum ionization at the reflecting layer concerned.

During the year, 49,635 hours of field intensity measurements of reception from various stations at various frequencies were made and reduced at the Laboratory and summaries of the data were forwarded to Washington. Four of the receiving units were redesigned and reconstructed, embodying crystal control, thus practically eliminating any frequency drift with temperature, and minimizing the amount of monitoring required.

Test of the effect of distance on field intensity was started in June by installation of duplicate recording equipment at Intervale, New Hampshire, ninety miles further from Washington than is Needham. Comparison runs were made on WWV, five and ten megacycles, throughout the summer of 1947. Early results indicate that the somewhat weaker signals at the greater distance show heavier absorption during the midday hours, as could be expected.

During the past year experimental apparatus was assembled for recording bursts of solar radiation at radio frequencies. A remarkable exhibit of such radiation accompanied the large sunspot group of March, 1947, and bursts of solar noise exceeding two microvolts occurred on March 8, March 9, and again on March 13 at a frequency of forty-five megacycles. The dipole unit utilized was so constructed that through proper orientation it could be directed to the sun, or at right angles to the solar rays, for determining a null point, thus removing doubt that such "noise" as was detected was of solar origin. Improvements will be made to increase the signal-to-noise ratio and also the general sensitivity of the apparatus.

Certain field generators were constructed in the shops for

determining the constants, or equivalent lengths, of the several antennas in use at the Laboratory so that relative field intensity measurements may be reduced to absolute determinations of microvolts per meter.

A conference on radio wave propagation phenomena was again held at the Laboratory in December, 1946, at which representatives from outside institutions and industrial organizations were present. In addition, the Laboratory entertained from time to time numerous investigators interested in radio wave propagation and allied phenomena. In turn, the Laboratory was represented at special conferences in Washington and elsewhere.

Angus W. Mackiernan was added to the staff as research assistant, and many technological improvements to the equipment and advances in experimental work were made possible on this account. Dr. Stetson, who since 1938 has been chairs man of the special committee on cosmic terrestrial relationship- of the American Geophysical Union, National Research Council, was reappointed to serve in this capacity for another three years from July 1, 1947.

The Laboratory continues to acknowledge the support it has received through contracts made with the Division of Industrial Coöperation, and from gifts of funds and apparatus from numerous sources to augment the limited Cosmic Terrestrial Research Fund originally set up for its operation.

HARLAN T. STETSON

REPORT OF THE TREASURER

REPORT OF THE TREASURER

AUDITORS' CERTIFICATE

To the Auditing Committee of the Massachusetts Institute of Technology:

We have examined the accompanying balance sheet of Massachusetts Institute of Technology as at June 30, 1947 (pages 188 and 189) and the related statements of income and expense (pages 190 and 191), surplus from operations (page 192), and certain reserve funds (page 175) for the year ended June 30, 1947, have reviewed the system of internal control and the accounting procedures of the Institute and, without making a detailed audit of all the transactions, have examined or tested accounting records and other supporting evidence by methods and to the extent we deemed appropriate.

In our opinion, said financial statements present fairly the position of Massachusetts Institute of Technology at June 30, 1947, and the results of its operations for the year then ended.

LYBRAND, ROSS BROS. & MONTGOMERY

Boston, Massachusetts
September 18, 1947

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, 1947, and their certificate is submitted herewith.

Respectfully,

PHILLIPS KETCHUM
THOMAS D. CABOT
HENRY E. WORCESTER, *Chairman*

September 18, 1947

TREASURER'S STATEMENT

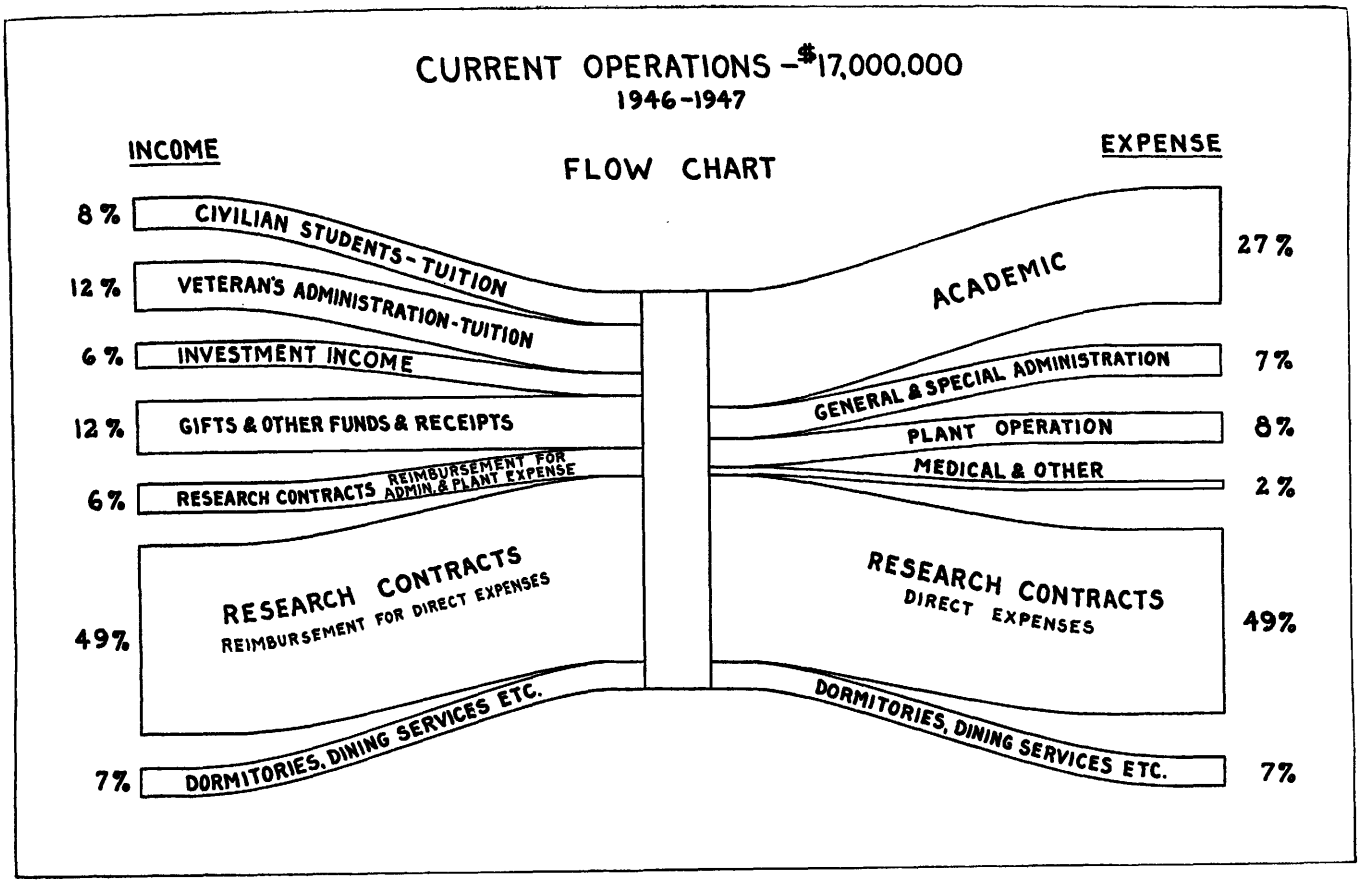
To the Corporation:

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, 1947, 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) SURPLUS FROM OPERATIONS. The first two are broken down into supporting schedules designated A-1, B-1, etc.

EDUCATIONAL PLANT

Total plant assets, $18,368,000 (Schedule A-20), have increased over $1,000,000 during the year. This increase is largely due to the purchase of the former Radiation Laboratory Building No. 24, the completion of the Gas Turbine Laboratory, a further addition to the Sloan Automotive Laboratory, the completion of the Campus Room addition to the Graduate House and to payments on account of the design, working plans, and specifications of the proposed Library, Senior House, Hydrodynamics Laboratory, and Nuclear Research Laboratory.


CURRENT OPERATIONS – $17,000,000
1946-1947
FLOW CHART
INCOME
EXPENSE
8 % CIVILIAN STUDENTS - TUITION
12 % VETERAN'S ADMINISTRATION - TUITION
6 % INVESTMENT INCOME
12 % GIFTS & OTHER FUNDS & RECEIPTS
6 % RESEARCH CONTRACTS REIMBURSEMENT FOR ADMIN. & PLANT EXPENSE
49 % RESEARCH CONTRACTS REIMBURSEMENT FOR DIRECT EXPENSES
7 % DORMITORIES, DINING SERVICES ETC.
ACADEMIC 27 %
GENERAL & SPECIAL ADMINISTRATION 7 %
PLANT OPERATION 8 %
MEDICAL & OTHER 2 %
RESEARCH CONTRACTS DIRECT EXPENSES 49 %
DORMITORIES, DINING SERVICES ETC. 7 %

The Year's Operations

The flow chart opposite shows, for the first time, the sources of *all* income and expenses for the year ended June 30, 1947. In previous years, and particularly during the war, when contract income and expenditures greatly exceeded those for ordinary operations, it was deemed advisable to present such contract income and expenditures with limited detail. For comparison, they continue to have a segregated presentation below.

Income from students, including loan and scholarship awards, $3,431,000, was $1,526,000 over last year. Income from investments increased over 1946 by $126,000, reflecting increased stock dividends received.

Research Contract revenues, $9,825,000, compare with $24,200,000 last year (see page 174).

Academic and Educational expenses increased in excess of $1,500,000 over last year. General and Special Administrative Expenses were $242,000 over 1946 and Plant Operation and Maintenance was $828,000, $202,000 over last year.

Other Expenses, Medical and Undergraduate Activities increased $115,000 over the previous year.

Total Expenses exceeded Income by $4,784.06. The Cumulated Operating Deficit (Schedule C) now stands at $41,642.28.

Contract Operations

There follow two summaries of contract operations of the Division of Industrial Coöperation, of which the first shows the contract revenues and direct costs for the year ended June 30, 1947, and the second presents an interesting and significant comparison of operations over the past five years. The number of contracts in force as at June 30, 1947, was 153.

D. I. C. OPERATIONS FOR 1946–47

Costs reimbursed:	
Salaries and Wages	$4,009,638.92
Terminated Orders	735,679.06
Materials and Services	3,032,993.53
Travel, Communications, Shipping, etc.	165,919.09
Other	74,044.17
	$8,018,274.77
Overhead allowances under contracts for administrative and plant expenses and for the use of Institute facilities and funds (see page 190)	1,806,659.76
Total Contract Revenues	$9,824,934.53

The following is a five-year summary of the operations of the Division of Industrial Coöperation:

	Fiscal 1947	*1946*	*1945*	*1944*	*1943*
Total Volume (Revenues)	$9,824,900	$24,294,500	$39,970,900	$25,461,300	$14,951,800
Dollar increase over previous year	14,469,600*	15,676,400*	14,509,600	10,509,500	7,129,000
Percentage increase over previous year	60%*	39%*	57%	70%	91%
Salaries and Wages	4,009,000	8,409,000	12,529,700	9,412,100	6,250,000
Overhead Allowances	1,806,600	1,547,100	1,312,300	1,142,500	851,000
Percentage of Salaries and Wages	46%	18%	10.5%	12.2%	13.6%
Percentage of Revenues	18.5%	6.3%	3.3%	4.5%	5.7%

* Decrease

Endowment and Other Funds

The book value of the Endowment and other funds stands at $47,487,000 — an increase of over $1,000,000, principally from gifts.

An analysis of the principal Reserve Funds is shown below:

ENDOWMENT RESERVE FUND

(Accumulated net gain on general investments)

BALANCE June 30, 1946		$2,286,142.49
Add:		
Net gain from sales of securities		170,128.99
		$2,456,271.48
Deduct:		
Amortization of bond premiums, custodian fee, etc.		59,621.55
BALANCE June 30, 1947		$2,396,649.93

INDUSTRIAL FUND

BALANCE June 30, 1946		$285,691.87
Add:		
Allocation from general investment income — 1947		9,952.50
Appropriation from 1947 industrial research contract revenues		129,700.00
Royalties — Research Corporation		41,273.72
Miscellaneous Contributions		350.00
		$466,968.09
Deduct:		
Special appropriations (net)	$59,438.55	
Salary and other payments	4,209.00	63,647.55
BALANCE June 30, 1947		$403,320.54

RESERVE FOR USE OF FACILITIES

BALANCE June 30, 1946		$430,037.27
Add:		
Appropriation from 1947 research contract revenues		261,800.00
		$691,837.27
Less special appropriations — Laboratories	$161,500.00	
— Reconversion of facilities	384,338.36	545,838.36
BALANCE June 30, 1947		$145,998.91

UNDISTRIBUTED INVESTMENT INCOME

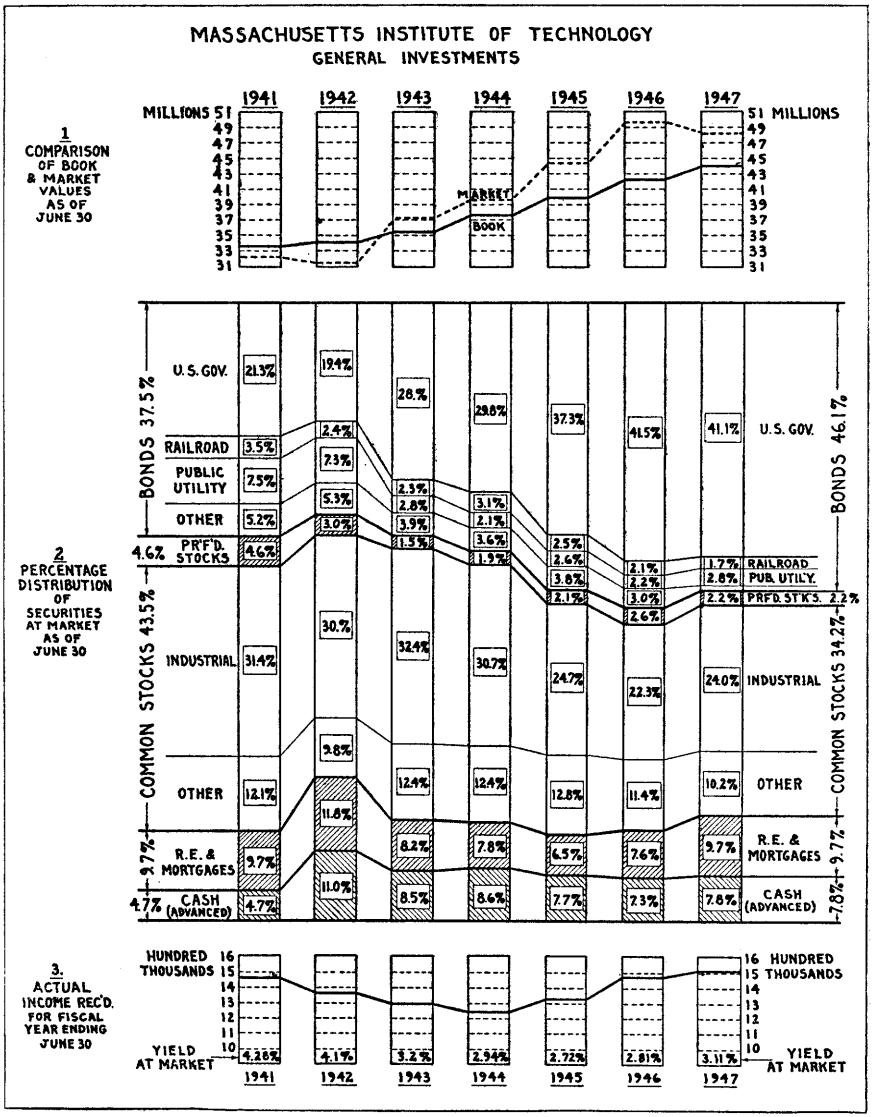
BALANCE June 30, 1946	$10,113.12
Undistributed for 1946–1947	13,518.78
BALANCE June 30, 1947	$23,631.90

INVESTMENTS

SUMMARY OF INVESTMENTS AS AT JUNE 30, 1947

General Investments	*Book*	*Market*	*Per Cent at Market*
Bonds —			
United States Government	$19,371,789	$19,792,769	41.1
Canadian	223,500	234,125	.5
Public Utility and Others	1,314,978	1,357,425	2.8
Railroad	814,652	825,540	1.7
Total	$21,724,919	$22,209,859	46.1
Preferred Stocks —			
Industrial and Other	$504,466	$395,964	.8
Public Utility	352,279	383,125	.8
Railroad	194,850	286,785	.6
Total	$1,051,595	$1,065,874	2.2
Common Stocks —			
Industrial	$7,884,356	$11,622,524	24.0
Public Utility	864,190	946,214	2.0
Railroad	345,338	344,525	.7
Bank and Finance	2,463,248	2,228,522	4.6
Insurance and Other	1,191,487	1,416,845	2.9
Total	$12,748,619	$16,558,630	34.2
Real Estate	4,514,612	4,514,612	9.4
Mortgages	147,113	147,113	.3
Cash — Advanced (Schedule A)	3,388,916	3,388,916	7.0
Total General Investments	$43,575,774	$47,885,004	99.2
Students' Notes	380,041	380,041	.8
Total General Investments including Students' Notes	$43,955,815	$48,265,045	100.0
Special Investments	3,531,730	3,722,828	
ALL INVESTMENTS	$47,487,545	$51,987,873	

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 REC'D. FOR FISCAL YEAR ENDING JUNE 30
1941 1942 1943 1944 1945 1946 1947
MILLIONS 51 49 47 45 43 41 39 37 35 33 31
51 MILLIONS
MARKET
BOOK
BONDS 37.5%
BONDS 46.1%
U.S. GOV. 21.3% 19.4% 28.% 29.8% 37.3% 41.5% 41.1% U.S. GOV.
RAILROAD 3.5% 2.4% 2.3% 2.5% 2.8% 3.1% 2.1% 3.6% 1.9% 2.5% 2.6% 3.8% 2.1% 2.1% 2.2% 3.0% 2.6% 1.7% 2.8% RAILROAD
PUBLIC UTILITY 7.5% 5.3% 3.0% 3.9% 1.5% PUB. UTIL'Y.
OTHER 5.2%
4.6% PRF'D. STOCKS 4.6% 2.2% PRF'D. ST'K'S. 2.2%
COMMON STOCKS 43.5%
COMMON STOCKS 34.2%
INDUSTRIAL 31.4% 30.% 32.4% 30.7% 24.7% 22.3% 24.0% INDUSTRIAL
OTHER 12.1% 9.8% 12.4% 12.4% 12.8% 11.4% 10.2% OTHER
9.7% R.E. & MORTGAGES 9.7% 11.8% 8.2% 7.8% 6.5% 7.6% 9.7% R.E. & MORTGAGES 9.7%
4.7% CASH (ADVANCED) 4.7% 11.0% 8.5% 8.6% 7.7% 7.3% 7.8% CASH (ADVANCED) 7.8%
HUNDRED THOUSANDS 16 15 14 13 12 11 10
16 HUNDRED 15 THOUSANDS
YIELD AT MARKET 4.28% 4.1% 3.2% 2.94% 2.72% 2.81% 3.11% YIELD AT MARKET
1941 1942 1943 1944 1945 1946 1947

Investments

There was little change percentagewise in the make up of our general (pooled) investments. Bond holdings decreased 2.7 to 46.1 per cent, with Governments at 41.1 per cent. Common stocks were up slightly at 34.2 per cent, with real estate investments increased 2 per cent.

The book value of all of the Institute's investments (including advances for Current Operations) increased $1,500,000 to $47,487,000. The market value decreased $1,313,000 to $51,988,000 or $4,500,000 in excess of book — a ratio of 109 per cent. This compares with 116 per cent last year.

Investment Income

The income allocation to funds sharing the general investments was at 3.75 per cent. Last year the allocation was at 3.50 per cent. The total includes the interest on funds advanced by the Institute for D. I. C. operations. The average amount advanced by the Institute during the twelve months was $2,650,000.

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 operation of the Technology Loan Fund Committee, (3) a report of the Trustees of the M. I. T. Pension Association.

Respectfully submitted,

Horace S. Ford, *Treasurer*

September 15, 1947

GIFTS AND BEQUESTS RECEIVED DURING THE YEAR ENDED JUNE 30, 1947

GIFTS FOR ENDOWMENT

Funds for General Purposes

Charles G. Cutter Estate, for Horace Herbert Watson Fd.(additional)	$14.50
Walter W. Hodges Trust, for Walter W. Hodges Fund (additional)	12.50
Marion Westcott Trust for Marion Westcott Fund (additional)	950.00
	$977.00

Funds for Designated Purposes

Contributions — Class of 1922 (additional)	$16,215.88
Mary E. Blanchard Trust for Huse T. Blanchard Fund	6,550.64
Richard Chichester duPont Memorial Fund (additional)	33,111.30
Charles Hayden Foundation for Charles Hayden Fund (additional)	421.64
Edward A. Jones Estate for Edward A. Jones Fund	41,254.33
William Kneisner for Amelia S. Kneisner Scholarship Fd. (additional)	4,000.00
Margaret A. Mathews Estate for Margaret A. Mathews Fund	111,682.17
Alexander G. Mercer Estate for Hall-Mercer Fund (additional)	2,482.13
Mr. and Mrs. Willis W. Reeves for W.W. Reeves, Jr., Scholarship Fund	1,000.00
Estate of Ruth M. Sherman for Scholarship	10,000.00
Alfred P. Sloan, Jr., for Professorship in Ind. Management (additional)	100,000.00
George T. Southgate for Class of 1909 Fund	250.00
Elizabeth R. Stevens Estate for Albert F. Boyden Fund (additional)	429.23
	$327,397.32
TOTAL GIFTS FOR ENDOWMENT	$328,374.32

GIFTS FOR STUDENT LOAN FUNDS

Edward S. Chapin for Class of 1898 Loan Fund	$200.00
Elizabeth Lamson Estate for Lamson-Virgin Loan Fund (additional)	3,000.00
Lewis J. Seidensticker for Class of 1898 Loan Fund	450.00
	$3,650.00

GIFTS FOR BUILDING FUNDS

Combustion Engineering Co. for Hydrodynamics Laboratory	$25,000.00
Arthur J. Conner for Arthur J. Conner Fund (additional)	2,000.00
Thomas C. Desmond for Hydrodynamics Laboratory (additional)	1,666.67
Charles Hayden Foundation for Memorial Library	1,000,000.00
Sloan Foundation for Building Construction	71,667.00
United Shoe Machinery Corp. for Metals Processing Laboratory	10,000.00
	$1,110,333.67

OTHER GIFTS (Principal Available for Use)

Funds for General Purposes — Invested

Anonymous for General Purposes	$1,000.00
James M. Barker for General Purposes	3,800.00
Stephen L. Bartlett Estate for Bartlett Fund (additional)	4,309.25
Matthew C. Brush Estate for Matthew C. Brush Fund	31,395.74
Mary A. Carleton Estate for Mary A. Carleton Fund (additional)	46.50
Helen Collamore Estate for Helen Collamore Fund (additional)	49,500.00
William T. Henry Trust for William T. Henry Fund (additional)	12,970.00
Gordon S. Rentschler for General Purposes	5,000.00
George Sloan for General Purposes	100.00
Grant Walker Trust for Grant Walker Fund (additional)	5,500.00
Harry C. Wiess for General Purposes	11,500.00
	$125,121.49

Funds for Designated Purposes — Invested

Contributions — M. I. T. Alumni Fund, 1946–47	$75,233.39
M. I. T. Alumni Fund, 1947–48	116,177.44
Boston Stein Club (additional)	3,058.66
Cosmic Terrestrial Research Fund (additional)	7,500.00
Group Dynamics Fund (additional)	11,250.00
Industrial Relations Fund (additional)	27,220.02
Kurrelmeyer Fund (additional)	20.00
M. I. T. Club of Chicago (additional)	750.00
John D. Mitsch Memorial Fund (additional)	360.00
American Can Company for Food Technology	10,000.00
Committee for Economic Development for Salaries	3,780.00
Dow Chemical Company for Food Technology Fund	10,000.00
Charles Hayden Foundation for Charles Hayden Memorial Special	11,078.36
Oscar Horovitz for Special Purposes	1,000.00
E. Lorenz for A. Norton Kent Fund	100.00
George McKnight for Edward Austin Scholarship Fund	150.00
C. Lillian Moore Estate for John A. Grimmons Fund (additional)	2,453.59
Radio Corporation of America for Fellowship in Electronics	10,000.00
Socony Vacuum Oil Company for Fellowship in Electronics	5,000.00
Standard Brands for Food Technology Fund	10,000.00
Stone & Webster Eng. Corp. for Nuclear Science and Engineering	15,000.00
Albert Stone, Jr., for Albert Stone Fund	3,000.00
Swift & Company for Research	15,000.00
Tau Beta Pi for Scholarship	1,245.50
Towle Mfg. Co. for Towle Lecture Fund	1,000.00
Twentieth Century-Fox Film Company for Research	2,500.00
Westinghouse Electric Corp. for Fellowship	12,500.00
Albert J. Wiggin Foundation for Industrial Economics	1,000.00
	$356,376.96

Funds for Designated Purposes — Current Use

Contributions — German Chemical Documents for Library Fund	$1,050.00
Structural Laboratory for Civil Engineering	520.00
Alvin Brown for Alvin Brown Fund	500.00
Allied Chemical and Dye Corporation for Fellowships	3,600.00
American Cancer Society for Research	6,825.00
American Cancer Society for Fellowship	500.00
American Petroleum Institute for Research	11,700.00
American Philosophical Society for Research	1,200.00
American Smelting and Refining Company for Scholarship	3,900.00
American Society of Mechanical Engineers for Research	2,250.00
Armour & Company for Research	29,000.00
Baruch Committee on Physical Medicine for Research	900.21
Bristol Laboratories, Inc. for Research	3,450.00
Vannevar Bush for Research	100.00
Godfrey L. Cabot for Cabot Pigment Research	7,000.00
Karl T. Compton for President's Fund	1,090.60
Continental Can Company for Research	10,000.00
Corn Industries Research Foundation for Research	10,700.00
Diamond Alkali for Diamond Alkali Fund	4,000.00
Distillation Products, Inc. for Fellowship	1,500.00
Douglas Aircraft Corporation for Scholarship	1,500.00
E. I. duPont de Nemours & Co. for Research and Fellowships	20,400.00
Eagle Ottawa Leather Company for Scholarship	1,000.00
Eastman Kodak Company for Fellowship	1,950.00
Fabric Research Laboratories for Mechanical Engineering	500.00
General Plate Division of Metals and Controls for Metallurgy	500.00
Geological Society of America for Research	7,815.00
R. E. Gillmor for Gillmor Fund	1,500.00
Clark Goodwin for Geophysics Research	500.00
Gulf Oil Company for Research	1,100.00
T. C. Haffenreffer for Dean's Fund, Special	1,500.00
Harshaw Chemical Company for Research	9,000.00
Hartford Empire Company for Food Technology	10,000.00
Robert Hockett for Robert Hockett Fund	1,273.70
Hoffmann LaRoche, Inc. for Hoffmann LaRoche Fellowship	1,500.00
Charles H. Hood Dairy Foundation for Nutrition Research	2,600.00
Humble Oil and Refining Company for Fellowship	6,250.00
International Nickel Co., Inc. for Fellowship	2,200.00
Phillips Ketchum for Special Purposes	200.00
Kimberly-Clark Corp. for Fellowship	3,700.00
Arthur D. Little, Inc. for Special Fellowship	850.00
Loeb Foundation for Loeb Foundation Fund	10,000.00
Joe Lowe Corporation for Research	1,500.00
Newman Marsilius for Marsilius Fund	1,500.00
Thomas H. McConica, III, for Thomas Midgley, Jr., Fellowship	500.00
National Academy of Sciences for Welch Fund	1,000.00

National Lime Association for Research	$5,000.00
National Live Stock and Meat Board for Fat Research	3,000.00
New England Carbide Tool Company for Research	900.00
Pan American Refining Corp. for Fellowship	3,100.00
Pan American Sanitation Bureau for Pan American Fund	764.11
Pentagon Post Research Council for Research	57.70
Pittsburgh Consolidation Coal Co. for Fellowship	3,000.00
Plastics Materials Manufacturers' Assn. for Research	30,000.00
Polaroid Corporation for Library	100.00
Procter & Gamble Company for Procter & Gamble Fund	2,700.00
Procter & Gamble Co. for Fellowship	3,000.00
George Putnam for Putnam Fund	300.00
Quaker Oats Co. for Quaker Nutrition Fund	9,600.00
Radiation Luncheon Club for Scholarship	1,003.15
Radio Corporation of America for Award	1,000.00
Republic Steel Corporation for Research	10,000.00
Research Corporation for Vitamin A and D Research	2,000.00
Research Corporation for Research	5,000.00
Revere Copper and Brass for Research	1,600.00
Rockefeller Foundation for Research	74,950.00
Schenley Distillers Corp. for Library Fellowship	8,000.00
Sharp & Dohme, Inc. for Research	3,200.00
Sheffield Foundation for Metallurgy	5,000.00
Socony Vacuum Oil Company for Fellowship	4,000.00
Spool Cotton Company for Clark Thread Fellowship	5,400.00
Standard Brands for Fellowship	2,200.00
Standard Oil of California for Fellowship	2,200.00
Standard Oil of Indiana for Fellowship	3,700.00
Sugar Research Foundation for Sugar Research Fund	25,000.00
Swift & Company for Research	8,000.00
Titanium Alloy Company for Titanium Company Fund	375.00
Unexcelled Chemical Corporation for Metallurgy	2,400.00
United Engineering Trustees for Welding Research	8,500.00
United States Rubber Company for Graduate Fellowship	2,800.00
United States Steel Corporation for United States Steel Fund	4,560.00
Union Bay State Chemical Company for Research	500.00
Vanadium Alloys Company for Fellowship	3,000.00
Ralph Walker for Special Purposes	250.00
Mrs. Julia P. Whitney for Scholarship	200.00
Howard D. Williams for Howard D. Williams Fund	500.00
Simon Wolf for Pan American Fund	400.00
	$437,384.47
TOTAL OTHER GIFTS (principal available for use)	$918,882.92

MISCELLANEOUS GIFTS

Contributions — Class of 1920 (additional)	$94.00
Class of 1921 (additional)	380.00
Class of 1923 (additional)	694.36
Class of 1924 (additional)	25.00
Class of 1926 (additional)	6,006.14
Class of 1928 (additional)	44.32
Anonymous for Anonymous "Q" Fund (additional)	1,090.00
Christopher Cella for Purchase of a Launch	2,000.00
Edward S. Chapin for Alumni Special Gift	100.00
Edward V. French for Class of 1889 Fund	171.88
J. C. Melvin Trust for Scholarship	9,800.00
Museum Committee	40.00
President's Office	495.20
Paul M. Wiswall for Sailing Pavilion	500.00
	$21,440.90

SUMMARY

Gifts for Endowment		
Funds for General Purposes	$977.00	
Funds for Designated Purposes	327,397.32	$328,374.32
Gifts for Student Loan Funds		3,650.00
Gifts for Building Funds		1,110,333.67
Other Gifts (principal available for use)		
Funds for General Purposes — Invested	$125,121.49	
Funds for Designated Purposes — Invested	356,376.96	
Funds for Designated Purposes — Current Use	437,384.47	918,882.92
Miscellaneous Gifts		21,440.90
		$2,382,681.81

REPORT OF THE TRUSTEES OF THE M. I. T. PENSION ASSOCIATION

COMPARATIVE BALANCE SHEET

ASSETS

	June 30, 1946	*June 30, 1947*
Cash	$18,314.67	$15,217.46
Investments (page 185)	1,860,261.35	[1]1,924,454.61
Total	$1,878,576.02	$1,939,672.07

[1] Market Value June 30, 1947, $2,075,866.

LIABILITIES

Teachers' Annuity Fund (5% salary deduction, plus interest)	$1,109,945.78	$1,153,243.27
*M. I. T. Pension Fund (3% appropriation, plus interest)	727,675.62	750,721.77
Special Reserves for Annuity Payments	29,783.27	26,070.43
Total Liabilities	$1,867,404.67	$1,930,035.47
Reserve Fund (including undistributed income)	11,171.35	9,636.60
Total	$1,878,576.02	$1,939,672.07

*The Institute appropriates annually the equivalent of the 5% salary deduction, using 2% for payment of group insurance premiums.

RECEIPTS AND EXPENDITURES FOR 1946–1947

RECEIPTS

5% salary deductions added to Teachers' Annuity Fund	$141,510.76
3% appropriations added to M. I. T. Pension Fund	85,015.98
Income from investments (Net)	66,185.10
Profits on sales of securities	713.56
Appropriation — M. I. T. Teachers' Insurance Fund	12,000.00
Total Receipts	$305,425.40

EXPENDITURES

Paid on account of withdrawal or decease of members	$67,263.00
Used to purchase annuities for retiring members	169,041.25
Pensions paid directly to former retired members	5,928.40
Losses on sales of securities	1,338.89
Amortization of Bond Premiums	757.81
Total Expenditures	$244,329.35
Net Increase of Ledger Assets	$61,096.05

TRUSTEES OF THE M. I. T. PENSION ASSOCIATION

Karl T. Compton Horace S. Ford John R. Macomber
Ralph E. Freeman

A Record of Investments Held for Account of the Trustees of the M. I. T. Pension Association

Par Value or Shares				*Book Value*	*Net Income*
$75,000	U. S. Treasury.....	2s	1951–53	$75,000.00	$1,500.00
90,000	U. S. Treasury.....	2½s	1968	90,000.00	2,250.00
75,000	U. S. Treasury.....	2½s	1964–69	75,000.00	1,875.00
85,000	U. S. Treasury.....	2½s	1967–72	85,700.00	2,031.08
535,000	United States, G....	2½s	1954–59	535,000.00	11,500.00
35,000	Alabama Power.....	3½s	1972	35,000.00	1,225.00
50,000	Am. Tel. & Tel.....	2¾s	1961	55,250.00	641.67
50,000	Am. Tel. & Tel.....	2¾s	1980	50,300.00	1,375.00
50,000	Comm. Edison.....	3s	1977	52,700.00	1,500.00
34,000	Detroit Edison.....	4s	1965	34,648.00	1,360.00
48,000	Louisiana Pr. & Lgt..	3s	1974	49,436.00	1,440.00
50,000	Pac. Gas & Elec.....	3s	1974	51,800.00	1,500.00
50,000	Philadelphia Electric.	2¾s	1974	50,500.00	1,375.00
35,000	So. California Edison.	3s	1965	36,900.00	1,050.00
25,000	Balt. & Ohio.....	4s	1948	24,987.50	1,000.00
200	du Pont.....			29,504.20	1,600.00
1,000	Eastman Kodak.....			28,500.00	1,450.00
1,200	General Electric.....			52,597.76	1,920.00
600	General Motors			29,332.24	1,500.00
260	Int. Business Machines.....			26,401.93	1,560.00
1,600	Sears Roebuck.....			29,391.89	2,800.00
500	Standard Oil, Ind.....			23,621.75	1,000.00
800	Standard Oil, N. J.....			39,798.13	2,864.00
500	Union Carbide.....			41,575.54	1,625.00
1,500	United Fruit.....			38,575.21	3,750.00
500	United Shoe.....			35,910.62	1,750.00
200	Am. Tel. & Tel. Co....			33,896.34	1,800.00
480	Bankers Trust, N. Y....			23,687.50	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
55	Guaranty Trust Co., N. Y.....			12,424.50	615.00
225	Fireman's Fund Insurance.....			15,300.00	675.00
200	Hartford Fire.....			18,300.00	400.00
250	Insurance Co. of North America.....			16,000.00	750.00
200	Phoenix Insurance.....			16,900.00	600.00
	Real Estate, Albany, N. Y.....			57,828.00	2,634.85
	Income from investments sold or called				2,154.50
	Total Pension Association.....			$1,924,454.61	$66,185.10

REPORT OF THE TECHNOLOGY LOAN FUND COMMITTEE

COMPARATIVE BALANCE SHEET

ASSETS

	June 30, 1946		*June 30, 1947*	
Cash	$173,108.33		$53,211.52	
Investments (Schedule A-2)	1,229,253.82	$1,402,362.15	1,463,958.59	$1,517,170.11
Student Notes Receivable:				
Loans 1930 to date	$1,902,832.75		$1,931,809.75	
Less Repayments (including $5,728.68 written off) to date	1,480,268.55	422,564.20	1,563,426.38	368,383.37
TOTAL ASSETS		$1,824,926.35		$1,885,553.48

LIABILITIES

Technology Loan Fund:				
Total Subscriptions		$1,450,785.18		$1,450,785.18
Add:				
Investment Income (net)	$409,364.99		$451,308.16	
Interest from Loans	203,935.76		212,173.73	
Class of 1895 Memorial Fund	.....	613,300.75	1,824.00	665,305.89
		$2,064,085.93		$2,116,091.07
Deduct:				
Office Expense	$8,725.05		.....	
Net Loss on Securities	192,582.23		$192,567.92	
Written Off, Deceased Borrowers	2,579.85		2,579.85	
Legal Settlements	3,033.36		3,150.73	
Life Insurance Premiums	32,239.09	239,159.58	32,239.09	230,537.59
		$1,824,926.35		$1,885,553.48

RECEIPTS AND EXPENDITURES FOR 1946–47

RECEIPTS

Income (Investments)		$41,943.17
Interest (Loans)		8,237.97
Net Gain on Sales of Securities		14.31
Class of 1895 Memorial Fund		1,824.00
Office Expense — Recovery		8,725.05
Repayments on Loans (plus charge-offs)	$83,157.83	
Less: Loans Made	28,977.00	54,180.83
		$114,925.33

EXPENDITURES

Legal Settlements	117.37
NET INCREASE IN CASH AND INVESTMENTS	$114,807.96

TECHNOLOGY LOAN FUND COMMITTEE

Karl T. Compton, *Chairman*

Gerard Swope — Pierre S. du Pont — William C. Potter

Edwin S. Webster — Horace S. Ford

BURSAR'S STATEMENT

To the Treasurer:

The following principal Schedules

BALANCE SHEET	(A)
EDUCATIONAL AND ADMINISTRATIVE OPERATIONS	(B)
SURPLUS 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, 1947, as well as the transactions during the year.

D. L. RHIND, *Bursar.*

W. A. HOKANSON, *Assistant Bursar.*

September 12, 1947

SCHEDULE A

BALANCE SHEET
JUNE 30, 1947

INVESTMENTS

General Investments:		
U. S. Government Bonds		$19,371,788.50
Other Bonds		2,353,130.04
Preferred Stocks		1,051,595.58
Common Stocks		12,748,618.07
Real Estate (including $1,534,889.79 Campus properties) and Mortgages		4,661,725.49
Advances for Current Operations (per contra)		3,388,915.80
Total General Investments	(A-1)	$43,575,773.48
Investments of Funds Separately Invested	(A-2)	3,531,729.92
Students' Notes Receivable	(A-12)	380,041.21
		$47,487,544.61

CURRENT AND DEFERRED ASSETS

Cash:		
For General Purposes		$1,865,478.31
For Students' Safe-Keeping Deposits		79,975.74
Accounts Receivable, U. S. Government and Other (less $26,868.91 advances)	(A-13)	1,573,762.31
Contracts in Progress	(A-14)	1,682,660.88
Inventories, Prepaid Expenses and Deferred Charges	(A-15)	817,198.27
		$6,019,075.51

EDUCATIONAL PLANT

Land, Buildings and Equipment	(A-19)	$18,368,415.51
		$71,875,035.63

SCHEDULE A

BALANCE SHEET
JUNE 30, 1947

Invested Funds

Endowment Funds — Income Available:		
For General Purposes	(A-3)	$26,385,052.19
For Designated Purposes	(A-4)	7,902,727.63
Student Loan Funds	(A-5)	1,997,711.08
Building Funds — Principal and Income Available	(A-6)	3,137,676.78
Other Invested Funds — Principal and Income Available:		
For General Purposes	(A-7)	543,755.03
For Designated Purposes	(A-8)	3,380,599.69
Unexpended Balances of Endowment Fund Income for Designated Purposes	(A-4)	888,423.29
Deposits and Advances Held for Investment	(A-9)	467,059.39
Conditional Gifts, Income not yet available to Institute	(A-10)	387,889.60
Accumulated Net Gain on General Investments	(A-11)	2,396,649.93
		$47,487,544.61

Current Liabilities, Funds and Surplus

Advances from Invested Funds (per contra)		$3,388,915.80
Accounts Payable and Accrued Wages		559,288.78
Students' Advance Fees and Deposits	(A-16)	270,971.63
Students' Safe-Keeping Deposits		79,975.74
Federal Tax Withholdings, Savings Bond and Other Deposits	(A-17)	562,321.98
Total Liabilities		$4,861,473.93
Unexpended Balances for Designated Purposes:		
Investment Income not Distributed to Funds	(Page 175)	$23,631.90
Gifts and Other Receipts for Current Purposes — not invested	(A-18)	1,175,611.96
Surplus from Operations (Deficit)	(Schedule C)	*41,642.28*
		$6,019,075.51

Educational Plant Capital

Endowment for Educational Plant	(A-20)	$18,368,415.51
		$71,875,035 63

SCHEDULE B

STATEMENT OF INCOME AND EXPENSE FOR YEAR ENDED JUNE 30, 1947

INCOME

EDUCATIONAL AND GENERAL		
TUITION AND OTHER FEES (including $107,834.16 from investment income for scholarship awards)...(B-1).....		$3,430,824.29
INVESTMENT INCOME.....(B-2)	$1,645,742.22	
Less: $107,834.16 scholarship awards, $151,608.75 added to gifts and other receipts, $285,373.79 added to fund balances and $13,518.78 balance undistributed.....(B-2)	558,335.48	1,087,406.74
GIFTS AND OTHER RECEIPTS FOR CURRENT EXPENSES: Received during the year, including $151,608.75 investment income and $391,500.00 appropriated from research contract revenues.....(B-3)	$1,821,329.96	
Receipts of prior years drawn upon for expenses, less receipts during the year reserved for future use.....(B-3)	148,510.56	
(B-4).....		1,969,840.52
REVENUE FROM RESEARCH CONTRACTS (including $1,806,659.76 allowances for administrative and plant expenses and for use of facilities and funds) (B-5)	$9,824,934.53	
Less Appropriations therefrom: $261,800.00 to Reserve for Use of Facilities and $129,700.00 to Industrial Fund, total $391,500.00 and $99,447.00 to investment income for interest on M. I. T. funds advanced.....(B-5)	490,947.00	9,333,987.53
OTHER INCOME.....(B-6).....		86,931.04
Total Educational and General.....		$15,908,990.12
AUXILIARY ACTIVITIES — Dormitories, Dining services and Housing Projects (including $20,376.74 reserve funds used for current expenses).....(B-15).....		1,278,189.13
Total Operating Income.....		$17,187,179.25

SCHEDULE B

STATEMENT OF INCOME AND EXPENSE FOR YEAR ENDED JUNE 30, 1947

EXPENSES

EDUCATIONAL AND GENERAL			
ACADEMIC EXPENSES			
Salaries and Wages	(B-7)	$3,562,522.80	
Departmental Expenses (including research expenses of academic departments)	(B-8)	939,904.32	
Library and Museum Expenses	(B-9)	185,127.33	
			$4,687,554.45
RESEARCH CONTRACTS			
Salaries, Wages, Materials, Services and other costs directly incurred	(B-5)	8,018,274.77	
Administrative Expenses of Division of Industrial Coöperation	(B-5)	311,099.74	
			8,329,374.51
GENERAL EXPENSES			
Salaries of Officers		$243,425.78	
Clerical and Office Expense, Administration	(B-10)	362,091.35	
General Administrative Expense	(B-11)	541,225.41	
			1,146,742.54
PLANT OPERATION			
Department of Buildings and Power	(B-12)	$828,049.50	
Repairs, Alterations and Improvements (including approximately $227,000 for improvements to educational plant)	(B-12)	636,817.23	
			1,464,866.73
OTHER EXPENSES			
Medical Department	(B-13)	$138,156.53	
Undergraduate Budget Board	(B-14)	169,586.24	
			307,742.77
Total Educational and General			$15,936,281.00
AUXILIARY ACTIVITIES — Dormitories, Dining Services and Housing Projects	(B-15)		1,255,682.31
Total Operating Expenses			$17,191,963.31
Deficiency of Income	(Schedule C)		4,784.06
			$17,187,179.25

SCHEDULE C

SURPLUS FROM OPERATIONS (DEFICIT)
YEAR ENDED JUNE 30, 1947

DEFICIT June 30, 1946	$70,879.72
Deficiency of Income for the Year Ended June 30, 1947	4,784.06
Total	$75,663.78
LESS:	
Credit from Adjustment of Inventories to Cost	34,021.50
DEFICIT June 30, 1947	$41,642.28

SCHEDULE A-1

GENERAL INVESTMENTS

U. S. Government Bonds

Par Value				*Book Value*	*Net Income*
$800,000	U. S. Treasury.....	2s	1954–52	$800,000.00	$16,000.00
3,500,000	U. S. Treasury.....	2¼s	1959–56	3,597,000.00	74,531.25
7,500,000	U. S. Treasury.....	2¼s	1962–59	7,503,800.00	168,750.00
1,000,000	U. S. Treasury.....	2½s	1954–52	1,003,500.00	25,000.00
1,000,000	U. S. Treasury.....	2½s	1967–62	1,046,000.00	10,370.88
5,000,000	U. S. Treasury.....	2½s	1972–67	5,004,100.00	125,000.00
417,000	U. S. Savings "G" .	2½s	1953–56	417,000.00	10,425.00
525	U. S. Savings "F"..		1957	388.50	.....
	Income from bonds sold.....				24,367.06
	Total U. S. Government Bonds.....			$19,371,788.50	$454,444.19

Canadian Bonds

$100,000	Canadian Nat. Ry..	4½s	1956	$112,000.00	$4,500.00
100,000	Canadian Nat. Ry..	4½s	1957	111,500.00	4,500.00
	Income from bonds sold or called ...				16,183.11
	Total Canadian Bonds.....			$223,500.00	$25,183.11

Public Utility and Other Bonds

$250,000	American&For.Power	5s	2030	$246,478.00	$12,500.00
200,000	Am. Tel. & Tel.....	2¾s	1975	200,000.00	5,500.00
100,000	Florida Power & Light	3½s	1974	103,600.00	3,500.00
94,000	FloridaPower&Light	4⅛s	1979	94,000.00	3,877.50
198,000	Puget Sound Pr. & Lt.	4¼s	1972	203,400.00	8,415.00
182,000	United Gas Corp...	3s	1962	182,000.00	5,460.00
186,000	Eastern Gas and Fuel	3½s	1965	189,500.00	6,510.00
96,000	Ry. and Light Sec...	3¾s	1955	96,000.00	3,120.00
	Income from bonds sold or called ...				6,417.97
	Total Public Utility and other bonds...			$1,314,978.00	$55,300.47

SCHEDULE A-1 — (Continued)

RAILROAD BONDS

Par Value				*Book Value*	*Net Income*
$15,000	Baltimore & Ohio..	4s	1948	$14,992.50	$600.00
50,000	B.&O.,P.,L.E.&W.Va.	4s	1980	48,643.75	2,000.00
100,000	Boston & Maine....	5s	1955	90,000.00	5,000.00
128,000	Delaware & Hudson	4s	1963	128,000.00	5,120.00
115,000	Northern Pacific...	4s	1997	105,228.29	4,600.00
185,000	Northern Pacific...	4½s	1975	185,000.00	8,325.00
150,000	Southern Pacific....	4½s	1981	147,787.50	6,750.00
95,000	Virginian Corp.....	5s	1952	95,000.00	4,750.00
	Income from bonds called or matured.				7,108.05
	Total Railroad Bonds.....			$814,652.04	$44,253.05

INDUSTRIAL PREFERRED STOCKS

Shares			
2,000	American Air Lines Cum. Conv. 3½%	$204,000.00	$7,000.00
500	Bates Mfg. Company.....4½%	51,375.00	1,375.00
1,000	Columbia Pictures.....$4.25	103,000.00	4,250.00
24	Cornell-Dubilier Electric.....$5.25	2,400.00	126.00
300	Johns-Manville.....3½%	35,250.00	1,050.00
1,500	Railway & Light Securities.....4%	83,250.00	3,000.00
100	U. S. Rubber.....8%	14,850.00	200.00
100	U. S. Steel.....7%	10,341.28	700.00
	Income from stocks sold or called....		7,627.17
	Total Industrial Preferred Stocks.....	$504,466.28	$25,328.17

PUBLIC UTILITY PREFERRED STOCKS

1,500	N. E. Gas & Elec. Assoc. Cum. Conv.....4½%	$154,500.00	*$150.00*
1,000	Niagara Hudson Power.....5%	95,852.27	10,000.00
1,000	Public Service N.J.....5%	101,926.84	5,000.00
	Income from stock called.....		2,700.00
	Total Public Utility Preferred Stocks..	$352,279.11	$17,550.00

RAILROAD PREFERRED STOCKS

1,800	Atch., Top. & Santa Fe.....5%	$125,664.57	$9,000.00
1,000	C. & O. Cum. Conv.....3½%	69,185.62	.....
	Income from stocks sold or called....		6,000.00
	Total Railroad Preferred Stocks.....	$194,850.19	$15,000.00

SCHEDULE A-1 — (Continued)

Shares		*Book Value*	*Income*
	INDUSTRIAL COMMON STOCKS		
700	Allied Chemical and Dye	$117,046.66	$2,550.00
3,000	American Can	294,888.57	8,400.00
1,800	American Tobacco	137,840.76	3,000.00
3,000	Anchor Hocking Glass	135,915.73	.....
2,000	Caterpillar Tractor	92,194.13	6,000.00
223	Christiana Securities	579,374.35	32,898.60
1,600	Chrysler Corp.	87,992.05	6,000.00
3,000	Colgate Palmolive Peet	159,647.25	3,000.00
25	Dow Chemical	4,500.00	37.50
2,000	Draper Corp.	96,132.10	8,000.00
134	E. I. du Pont de Nemours	25,361.88	772.25
35,000	Eastman Kodak	614,545.21	50,750.00
8,950	General Electric	233,067.47	14,280.00
4,050	General Motors	148,774.46	10,075.00
1,800	General Radio	57,150.00	.....
2,500	Gulf Oil	130,025.05	6,250.00
3,680	Hercules Powder	149,159.94	6,256.00
8,200	Humble Oil & Refining	271,121.24	15,100.00
6,000	Inland Steel	199,974.49	12,000.00
1,050	International Business Machines	90,888.68	6,300.00
2,000	International Harvester	79,912.25	6,700.00
4,850	International Nickel	163,067.43	5,763.00
4,500	Johns Manville	126,518.70	5,250.00
2,500	Kennecott Copper Corp.	114,475.56	1,500.00
2,100	Liggett & Myers Tobacco	157,356.14	6,950.00
3,000	Liquid Carbonic	53,551.11	2,250.00
200	Mead Johnson	5,100.00	.....
3,000	Merck & Co.	109,633.44	6,300.00
6,000	Monsanto Chemical	132,927.64	10,500.00
3,500	Montgomery Ward	230,940.37	3,750.00
3,000	National Cash Register	111,153.45	1,500.00
4,000	National Lead	118,093.64	6,000.00
2,000	National Steel	149,488.34	7,500.00
3,000	Owens Illinois Glass	175,697.57	9,000.00
4,500	J. C. Penney	135,143.28	13,500.00

SCHEDULE A-1 — (Continued)

Shares		*Book Value*	*Net Income*
	INDUSTRIAL COMMON STOCKS (*Continued*)		
3,500	Phillips Petroleum	$202,478.62	$1,725.00
6,000	Pittsburgh Plate Glass	83,197.11	7,200.00
5,000	Procter & Gamble	261,143.86	13,000.00
2,500	St. Joseph Lead	109,995.10	6,250.00
6,100	Sears Roebuck	120,671.79	10,550.00
1,000	Sherwin Williams	100,988.10	5,250.00
1,700	Standard Oil, Cal.	91,240.78	2,615.00
5,000	Standard Oil, Ind.	177,081.20	9,187.50
8,150	Standard Oil, N. J.	343,500.71	29,098.00
1,700	Texas Co.	99,888.19	1,600.00
4,550	Union Carbide and Carbon	267,023.10	14,712.50
1,000	United Carbon	34,391.49	2,000.00
12,000	United Fruit	185,613.18	30,000.00
3,000	United Shoe Machinery	206,807.06	10,500.00
100	U. S. Plywood	3,850.00	40.00
6,000	Westinghouse Electric	107,827.11	6,000.00
	Income from stocks sold		1,750.00
	Total Industrial Common Stocks	$7,884,356.34	$429,610.35
	PUBLIC UTILITY COMMON STOCKS		
7,500	Am. Gas & Elec.	$303,501.96	$15,261.45
1,430	American Tel. & Tel.	187,815.71	12,735.00
4,000	Boston Edison	144,599.74	9,600.00
8,000	Commonwealth Edison	228,272.21	11,200.00
	Income from stock sold		360.00
	Total Public Utility Common Stocks	$864,189.62	$49,156.45
	RAILROAD COMMON STOCKS		
2,000	Atch., Top. & Santa Fe	$180,079.31	$12,000.00
333 88/100	Chesapeake & Ohio	10,838.78	.....
2,000	Great Northern (Pfd.)	95,877.13	6,000.00
400	Norfolk & Western	58,542.78	5,200.00
	Total Railroad Common Stocks	$345,338.00	$23,200.00
	BANK AND FINANCE STOCKS		
3,750	Bankers Trust, N. Y.	$189,613.75	$6,750.00
1,000	Bond Investment Trust of America	101,620.00	2,000.00
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	6,795.00
1,100	Commercial Credit Corp.	46,751.42	2,200.00

SCHEDULE A-1 — (Continued)

Shares		*Book Value*	*Net Income*
	BANK AND FINANCE STOCKS (*Continued*)		
2,425	Cont. Ill. Nat. Bank, Chicago	$174,564.00	$9,650.00
4,986	First National, Boston	300,481.21	11,168.50
1,141	Guaranty Trust, N. Y.	319,108.04	12,648.00
667	Harris Trust & Savings, Chicago	146,587.00	8,004.00
2,000	Lincoln Rochester Trust	96,000.00	4,000.00
5,800	National City, N. Y.	252,022.08	9,280.00
100	New England Trust, Boston	40,000.00	3,000.00
6,000	Railway & Light Securities	108,750.00	7,200.00
	Income from stocks sold	.....	5,800.00
	Total Bank and Finance Stocks	$2,463,247.50	$104,495.50
	INSURANCE AND OTHER STOCKS		
2,250	Boston	$147,915.80	$4,950.00
1,700	Continental	68,383.05	3,400.00
2,550	Fireman's Fund	204,450.00	7,575.00
2,450	Hartford	157,303.85	6,175.00
3,500	Insurance Co. of North America	212,146.66	10,500.00
735	National Union	117,600.00	2,500.00
2,000	Phoenix	154,179.60	6,000.00
1,000	Stone & Webster, Inc.	29,507.65	1,250.00
4,000	American Research & Development Corp.	100,000.00	.....
	Total Insurance and Other Stocks	$1,191,486.61	$42,350.00

SCHEDULE A-1 — (Continued)

REAL ESTATE	*Book Value*	*Net Income*
111 Bay State Road, Boston	$18,600.00	$744.00
120 Bay State Road, Boston	31,966.25	323.00
Franklin Street, Boston	150,000.00	8,734.49
80 Memorial Drive, Cambridge	745,064.26	13,805.70
100 Memorial Drive, Cambridge (c)	153,510.85	*14,727.15*
333 Memorial Drive, Cambridge (c)	40,000.00	*1,235.10*
565 Memorial Drive, Cambridge (c)	200,560.50	*1,624.22*
211 Massachusetts Avenue, Cambridge	132,955.38	2,083.33
Graduate House, Cambridge (c)	655,601.94	.....
Bexley Hall, Cambridge	168,718.92	7,796.53
Westgate, Veterans Housing (c)	485,216.50	12,500.00
Gloversville, N. Y.*	217,663.83	6,631.68
Harrisonburg, Va.	30,814.12	1,495.00
New Bedford, Mass.	55,429.22	3,404.40
New London, Conn.	252,061.10	12,018.14
Lexington, Mass.	2,000.00	.....
Plattsburgh, N. Y.	205,356.37	9,373.13
Taunton, Mass.	206,474.24	9,366.96
Waltham, Mass.**	190,500.00	10,685.41
Willimantic, Conn.	168,168.17	7,626.45
Worcester, Mass., Main Street	204,221.45	9,264.05
Worcester, Mass., Federal Street	199,729.36	10,075.91
Income from Real Estate sold	.....	1,468.24
Total Real Estate	$4,514,612.46	$109,809.98

* Not including first mortgage of $11,300 with Connecticut Mutual Life Insurance Co.
** Not including first mortgage of $172,000 with Metropolitan Life Insurance Company.
(c) Campus properties.

MORTGAGE NOTES		
Bigelow	$4,200.00	$210.00
Common Street, Belmont	7,750.00	362.81
Park Avenue, Arlington	10,129.84	308.48
Pequosett Road, Belmont	12,317.38	563.31
Kirby Avenue, Marblehead	7,900.00	90.00
Alpha Tau Omega	14,300.00	760.25
Beta Theta Pi	14,500.00	375.00
Delta Kappa Epsilon	26,000.00	1,771.99
Kappa Sigma	10,250.00	531.26
Pi Lambda Phi	13,500.00	302.57
Phi Gamma Delta	6,125.00	252.93
Phi Kappa Sigma	3,000.00	250.00
Phi Mu Delta	6,640.81	.....
Sigma Chi	3,500.00	175.00
Theta Chi	7,000.00	375.06
Income from mortgages liquidated	.....	1,356.88
Total Mortgage Notes	$147,113.03	$7,685.54

SCHEDULE A-1 — (Continued)

RECAPITULATION, GENERAL INVESTMENTS	*Book Value*	*Net Income*
U. S. Government Bonds	$19,371,788.50	$454,444.19
Other Bonds		
Canadian	$223,500.00	$25,183.11
Public Utility and Others	1,314,978.00	55,300.47
Railroad	814,652.04	44,253.05
	$2,353,130.04	$124,736.63
Preferred Stocks		
Industrial and Other	$504,466.28	$25,328.17
Public Utility	352,279.11	17,550.00
Railroad	194,850.19	15,000.00
	$1,051,595.58	$57,878.17
Common Stocks		
Industrial	$7,884,356.34	$429,610.35
Public Utility	864,189.62	49,156.45
Railroad	345,338.00	23,200.00
Bank and Finance	2,463,247.50	104,495.50
Insurance and Other	1,191,486.61	42,350.00
	$12,748,618.07	$648,812.30
Real Estate	$4,514,612.46	$109,809.95
Mortgage Notes	147,113.03	7,685.54
Total General Investments	$40,186,857.68	*$1,403,366.78
Interest on Funds Advanced for Research Contracts		99,447.00
		$1,502,813.78

*Excluding cash advanced for Current operations.

SCHEDULE A-2

INVESTMENTS OF FUNDS SEPARATELY INVESTED

Par Value or Shares				*Book Value*	*Net Income*
	INVESTMENTS, AVOCA FUND				
2,400	General Radio			$76,200.00	.....
	INVESTMENTS, BABSON FUND				
469	A. P. W. Products			$126.10	.....
80	United Stores Corpn., Cum. Conv. Pfd.			8,034.54	$880.00
80	United Stores Corpn., 2d Pfd.			1,288.56	28.00
30	Standard Oil, Ind.			1,429.30	60.00
	Income from liquidation of trust				175.64
	Total Babson Fund			$10,878.50	$1,143.64
	INVESTMENTS (Real Estate), ALBERT FARWELL BEMIS				
	Miscellaneous building lots in Wellesley carried at			$11,300.00	.....
	INVESTMENTS, MALCOLM COTTON BROWN FUND				
$2,500	United States G	2½s	1954	$2,500.00	$62.50
30	General Electric			1,019.70	48.00
	Total Brown Fund			$3,519.70	$110.50
	INVESTMENTS, CLASS OF 1919 FUND				
$4,650	United States Savings "F"		1956–57	$3,441.00	.....
	INVESTMENTS, CLASS 1920 FUND				
$3,050	United States Savings "F"		1957	$2,331.00	.....
2,175	United States Savings "F"		1958	1,609.50	.....
	Total Class 1920 Fund			$3,940.50	.....
	INVESTMENTS, DRAPER FUND				
$21,000	U. S. Treasury	2½s	1967–72	$21,000.00	$525.00
29,900	United States "G"	2½s	1954	29,900.00	747.50
24,000	United States "G"	2½s	1955	24,000.00	600.00
10,000	Ontario	5s	1959	9,950.00	500.00
5,000	Baltimore & Ohio	4s	1948	5,000.00	52.50
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	4½s	1981	5,050.00	175.00
	Total Draper Fund			$104,364.97	$3,000.00

SCHEDULE A-2 — (Continued)

Par Value or Shares				*Book Value*	*Net Income*[1]
	INCOME, SAMUEL P. HUNT FUND				
	Income from stock sold				$306.00
	INVESTMENTS, ARTHUR D. LITTLE MEMORIAL FUND				
$33,000	U. S. Treasury	2s	1953–51	$33,000.00	$660.00
20,000	U. S. Treasury	2s	1954–52	20,000.00	400.00
30,000	U. S. Treasury	2½s	1972–67	30,000.00	750.00
466	Arthur D. Little, Inc., Pfd.			46,600.00	2,796.00
5,543	Arthur D. Little, Inc., Com.			110,860.00	33,258.00
	Income from bonds sold				221.74
	Total Little Fund			$240,460.00	$38,085.74
	INVESTMENTS, RICHARD LEE RUSSEL FUND				
$1,000	Mortgage Note (participation)			$1,000.00	$50.00
3,000	Mortgage			3,000.00	75.00
	Total Russel Fund			$4,000.00	$125.00
	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	24,219.95
96	Columbian Carbon			3,408.00	86.40
153	B. F. Goodrich			10,662.75	678.00
238	Missouri-Kansas Pipe Line			5,831.00	226.10
574	United Carbon			21,920.50	1,297.25
	Total Solar Energy Fund			$715,522.25	$27,027.70

[1]Net after Premium Amortization.

SCHEDULE A-2 — (Continued)

Par Value or Shares				*Book Value*	*Net Income*[1]
	INVESTMENTS, FRANCES E. AND SAMUEL M. WESTON FUNDS				
$6,950	Mortgage Note, Bartlett			$6,950.00	$305.33
	INVESTMENTS, JONATHAN WHITNEY FUND				
$331,000	United States "G"	2½s	1954–58	$331,000.00	$8,275.00
70,000	U. S. Treasury	2½s	1967–72	70,000.00	1,750.00
40,000	American&For.Power	5s	2030	37,178.70	2,000.00
40,000	Pacific Gas & Elec.	3s	1974	41,450.00	1,150.00
250	Boston Edison			8,250.00	600.00
350	Bankers Trust, N. Y.			16,612.50	607.50
100	du Pont			15,279.10	800.00
250	First National, Boston			11,525.00	562.50
500	General Electric			13,188.05	800.00
66	Guaranty Trust, N. Y.			18,087.30	708.00
400	National City, N. Y.			18,850.00	320.00
300	Standard Oil, N. J.			12,277.35	1,074.00
450	United Fruit			10,690.25	1,125.00
	Total Whitney Fund			$604,388.25	$19,772.00
	INVESTMENTS, TECHNOLOGY LOAN FUND				
$500,000	United States "G"	2½s	1954–58	$500,000.00	$12,500.00
100,000	U. S. Treasury	2s	1953–51	100,000.00	2,000.00
96,000	U. S. Treasury	2¼s	1962–59	96,000.00	2,160.00
80,000	U. S. Treasury	2½s	1958–56	80,000.00	2,000.00
80,000	U. S. Treasury	2½s	1954	80,500.00	1,500.00
100,000	U. S. Treasury	2½s	1967–72	102,580.00	2,081.38
35,000	American Tel. & Tel.	2¾s	1980	35,000.00	962.50
20,000	New Orleans Pub. Serv.	3⅛s	1974	20,000.00	375.00
15,000	Pacific Gas & Elec.	3s	1974	15,000.00	50.00
300	American Can			22,935.23	900.00
800	Cleveland Electric Illuminating			31,622.77	.....
200	du Pont			29,304.00	1,600.00
207	Engineers Pub. Serv, Pfd.			15,000.00	1,138.52
1,000	General Electric			25,813.25	1,600.00
177	Guaranty Trust, N.Y.			50,333.82	1,641.00
500	Gulf Oil			26,255.80	1,250.00
600	National Cash Register			21,729.50	.....
1,100	National City, N. Y.			40,650.00	1,280.00
1,000	North American			31,075.03	1,644.27
500	Procter & Gamble			29,511.45	.....
600	Standard Oil, N. J.			24,862.79	2,148.00
1,250	Stone & Webster, Inc.			36,698.75	1,562.50
400	Union Carbide and Carbon			27,726.00	1,300.00
900	United Fruit			21,360.20	2,250.00
	Total Technology Loan Fund			$1,463,958.59	$41,943.17

[1]Net after Premium Amortization.

SCHEDULE A-4

ENDOWMENT FUNDS

Income for Designated Purposes

	Departments and Research	PRINCIPAL *Balance, June 30, 1946*	PRINCIPAL *Gifts and Other Receipts*	PRINCIPAL *Expended or Transferred*	PRINCIPAL *Balance, June 30, 1947*
201	William Parsons Atkinson (English)	$13,082.20	.....	.....	$13,082.20
203	Albert Farwell Bemis (Bemis Foundation)	308,768.00	.....	.....	308,768.00
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 Fund (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
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	.....	.....	157,460.00
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
235	Ellen H. Richards (Sanitary Engineering)	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)	173,126.12	$6,491.25	$79.20	179,538.17
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	.....	.....	647,700.00
255	Edmund K. Turner (Civil Engineering)	282,962.14	2,653.12 (1)	.....	285,615.26
257	William R. Ware (Architecture)	15,000.00	.....	.....	15,000.00
		$2,812,259.81	$9,144.37	$79.20	$2,821,324.98
	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	10,0000.0	.....	.....	10,000.00
273	Arthur Rotch Architectural	5,000.00	.....	.....	5,000.00
275	John Hume Tod	2,500.00	.....	.....	2,500.00
277	Theodore N. Vail Memorial	67,506.27	.....	.....	67,506.27
		$122,006.27	.....	.....	$122,006.27

(1) One-fourth net income carried to Fund.

ENDOWMENT FUNDS

Income for General Purposes

Unexpended Balance June 30, 1946	Investment Income	Other Income	Expended	Transferred	Unexpended Balance June 30, 1947
		INCOME AND EXPENDITURES			
.....	$187.50	.....	$187.50	.....	.....
.....	36,045.00	.....	36,045.00	.....	.....
.....	468.75	.....	468.75	.....	.....
.....	645.00	.....	645.00	.....	.....
.....	1,346.25	.....	1,346.25	.....	.....
.....	3,000.00	.....	3,000.00	.....	.....
.....	8,298.75	.....	8,298.75	.....	.....
.....	356,208.75	.....	356,208.75	.....	.....
.....	9,791.25	.....	9,791.25	.....	.....
.....	284,021.25	.....	284,021.25	.....	.....
.....	1,125.00	.....	1,125.00	.....	.....
.....	937.50	.....	937.50	.....	.....
.....	37,500.00	.....	37,500.00	.....	.....
.....	11,238.75	.....	11,238.75	.....	.....
.....	187.50	.....	187.50	.....	.....
.....	945.00	.....	945.00	.....	.....
.....	68,681.25	.....	68,681.25	.....	.....
.....	57,277.50	.....	57,277.50	.....	.....
.....	810.00	.....	810.00	.....	.....
.....	37,500.00	.....	37,500.00	.....	.....
.....	13,740.00	.....	13,740.00	.....	.....
.....	1,380.00	.....	1,380.00	.....	.....
.....	6,138.75	.....	6,138.75	.....	.....
.....	562.50	.....	562.50	.....	.....
.....	937.50	.....	937.50	.....	.....
.....	937.50	.....	937.50	.....	.....
.....	1,875.00	.....	1,875.00	.....	.....
.....	3,131.25	.....	3,131.25	.....	.....
.....	9,382.50	.....	9,382.50	.....	.....
.....	2,508.75	.....	1,881.56	$627.19	.....
.....	180.00	.....	180.00	.....	.....
.....	1,875.00	.....	1,875.00	.....	.....
.....	176.25	.....	176.25	.....	.....
.....	941.25	.....	941.25	.....	.....
.....	885.00	.....	885.00	.....	.....
.....	1,350.00	.....	1,350.00	.....	.....
.....	187.50	.....	187.50	.....	.....
.....	6,427.50	.....	6,427.50	.....	.....
.....	9,090.00	.....	9,090.00	.....	.....
.....	993.75	.....	894.38	99.37	.....
.....	9,551.25	.....	9,551.25	.....	.....
.....	$988,466.25	.....	$987,739.69	$726.56	.....

SCHEDULE A-3

ENDOWMENT FUNDS

INCOME FOR GENERAL PURPOSES

		PRINCIPAL			
		Balance, June 30, 1946	*Gifts and Other Receipts*	*Expended or Transferred*	*Balance June 30, 1947*
101	George Robert Armstrong	$5,000.00	.....	.....	$5,000.00
103	George Blackburn Memorial	961,249.84	.....	.....	961,249.84
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
111	Eben S. Draper	105,260.01	.....	.....	105,260.01
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	.....	.....	25,212.48
133	Henry C. Frick	1,831,053.42	.....	.....	1,831,053.42
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	36,797.20	$12.50	.....	36,809.70
143	James Fund	163,654.21	.....	.....	163,654.21
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	66,933.68	627.19 (1)	.....	67,560.87
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
169	William J. Walker	23,613.59	.....	.....	23,613.59
171	Horace Herbert Watson	36,042.69	14.50	.....	36,057.19
173	Albion B. K. Welch	5,000.00	.....	.....	5,000.00
175	Everett Westcott	171,394.00	.....	.....	171,394.00
177	Marion Westcott	241,852.00	950.00	.....	242,802.00
179	George Wigglesworth	26,560.28	99.37 (2)	.....	26,659.65
181	Edwin A. Wyeth	254,703.94	.....	.....	254,703.94
	Totals	$26,383,348.63	$1,703.56	.....	$26,385,052.19

(1) One-fourth net income to Fund.
(2) One-tenth net income to Fund.

(Schedule A)

SCHEDULE A-2 — (Continued)

Par Value or Shares				*Book Value*	*Net Income*[1]
	INVESTMENTS, JOSEPH HEWETT FUND				
$10,000	United States "G"...	2½s	1958	$10,000.00	$250.00
50,000	United States "G"...	2½s	1954	50,000.00	1,250.00
15,000	Alabama Power.....	3½s	1972	15,000.00	525.00
15,000	Puget Sound Pr. & Lt.	4¼s	1972	15,200.00	537.50
12,000	Baltimore & Ohio....	4s	1948	12,000.00	186.00
10,000	Northern Pacific.....	4s	1997	10,550.00	375.00
10,000	Southern Pacific.....	4½s	1981	10,300.00	420.00
12,000	Texas & New Orleans.	3⅜s	1990	12,000.00	360.00
120	Bankers Trust, N. Y.....			4,775.00	216.00
22	Guaranty Trust, N. Y.....			5,078.70	246.00
50	Phoenix Insurance.....			3,750.00	.....
100	American Can.....			7,520.00	300.00
50	du Pont.....			8,271.55	400.00
300	General Electric.....			8,107.50	480.00
150	National Cash Register.....			5,428.99	.....
200	Standard Oil, Ind.....			9,498.65	400.00
200	Standard Oil, N. J.....			8,177.60	716.00
100	Union Carbide and Carbon.....			6,944.20	325.00
300	United Fruit.....			7,120.00	750.00
	Income from bonds called.....				225.00
	Total Hewett Fund.....			$209,722.19	$7,961.50
	INVESTMENTS, GEORGE S. WITMER FUND				
$5,800	United States "G"...	2½s	1954-55	$5,800.00	$145.00
5,000	Atlantic Coast Line..	4s	1952	4,854.44	200.00
3,000	Capital Transit.....	4s	1964	3,000.00	120.00
4,000	Central Pacific.....	4s	1949	4,025.00	135.00
5,000	Northern Pacific.....	4s	1997	4,903.79	200.00
4,000	Southern Pacific.....	4½s	1981	3,942.68	180.00
4,000	Florida Power & Light	4⅛s	1979	4,072.00	149.00
50	Electric Power & Light 6% Pfd.....			3,550.00	300.00
150	Capital Transit.....			5,100.00	75.00
150	Commonwealth Edison.....			5,082.43	210.00
110	Pacific Gas & Electric.....			4,736.43	250.00
50	General Electric.....			1,718.25	80.00
25	General Motors.....			1,310.96	62.50
43	Standard Oil, Ind.....			1,967.70	86.02
40	Standard Oil, N. J.....			1,706.32	143.20
30	Union Carbide and Carbon.....			2,051.85	97.50
65	Bankers Trust, N. Y.....			3,071.50	103.95
15	Continental Ill. Nat. Bank, Chicago...			1,387.50	60.00
22	Guaranty Trust, N. Y.....			5,920.20	246.00
	Real Estate, Sanford, Fla.....			4,882.92	304.69
	Total Witmer Fund.....			$73,083.97	$3,147.86
Total of Investments of Funds Separately Invested				$3,531,729.92	$142,928.44
Total General and Special Investments				$43,718,587.60	*$1,645,742.22
				(Schedule A)	(Schedule B)

* Excluding Cash Advanced for Current Operations and Students' Notes Receivable.
[1] Net after Premium Amortization.

ENDOWMENT FUNDS

Income for Designated Purposes

Unexpended Balance, June 30, 1946	Investment Income	Other Income	Expended	Transferred	Unexpended Balance, June 30, 1947
		INCOME AND EXPENDITURES			
.....	$491.25	.....	$491.25	.....	.....
$48,517.31	13,398.75	.....	14,380.71	.....	$47,535.35
11,576.77	1,361.25	.....	796.22	.....	12,141.80
8,200.20	2,182.50	.....	2,182.50	.....	8,200.20
.....	275.00	.....	275.00	.....	.....
458.69	78.75	.....	78.75	.....	458.69
.....	3,600.00	.....	3,600.00	.....	.....
.....	15,000.00	.....	15,000.00	.....	.....
807.23	405.00	.....	325.00	.....	887.23
2,941.51	2,913.75	.....	1,841.48	.....	4,013.78
10,853.22	2,921.25	.....	.....	.....	13,774.47
82,752.43	38,085.74	$956.25	750.00	$6,600.00	114,444.42
.....	187.50	.....	187.50	.....	.....
925.00	191.25	.....	.....	160.00	956.25
1,378.88	240.00	.....	240.00	.....	1,378.88
.....	14,838.75	.....	14,838.75	.....	.....
10,385.52	956.25	.....	956.25	.....	10,385.52
22,753.78	1,980.00	.....	1,980.00	.....	22,753.78
.....	6,491.25	.....	.....	6,491.25	.....
.....	75.00	.....	75.00	.....	.....
.....	937.50	.....	937.50	.....	.....
57,790.00	27,027.70	.....	9,879.94	28,127.37	46,810.39
.....	10,612.50	.....	7,959.38	2,653.12	.....
744.03	581.25	.....	536.71	.....	788.57
$260,084.57	$144,832.19	$956.25	$77,311.94	$44,031.74	$284,529.33
$481.60	$386.25	.....	$305.26	.....	$562.59
861.50	783.75	.....	60.30	.....	1,584.95
871.34	217.50	.....	197.49	.....	891.35
2,544.91	168.75	.....	129.76	.....	2,583.90
2,564.14	472.50	.....	9.84	.....	3,026.80
2,182.50	266.25	.....	251.06	.....	2,197.69
1,282.86	142.50	.....	42.82	.....	1,382.54
3,330.06	2,655.00	.....	2,970.00	.....	3,015.06
$14,118.91	$5,092.50	.....	$3,966.53	.....	$15,244.88

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (*Continued*)

		PRINCIPAL			
	SALARIES	*Balance, June 30, 1946*	*Gifts and Other Receipts*	*Expended or Transferred*	*Balance, June 30, 1947*
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	200,000.00	$100,000.00	.....	300,000.00
295	Nathaniel Thayer	25,000.00	.....	.....	25,000.00
297	Elihu Thomson	23,680.87	.....	.....	23,680.87
		$368,332.18	$100,000.00	.....	$468,332.18
	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	86,660.77	$33,111.30	$11,000.00	108,772.07
315	Clarence J. Hicks Memorial	20,000.00	.....	.....	20,000.00
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	Theodore B. Parker Memorial	3,000.00	.....	.....	3,000.00
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
341	Thomas Upham	409,018.92	.....	.....	409,018.92
343	Luis Francisco Verges	10,000.00	.....	.....	10,000.00
345	Jonathan Whitney	518,000.00	.....	.....	518,000.00
	Funds Transferred to Current Fund Group	29,259.09	.....	29,259.09	.....
		$1,702,317.52	$33,111.30	$40,259.09	$1,695,169.73

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (*Continued*)

Unexpended Balance, June 30, 1946	INCOME AND EXPENDITURES				Unexpended Balance, June 30, 1947
	Investment Income	Other Income	Expended	Transferred	
.....	$1,372.50	.....	$1,372.50	.....	.....
.....	18.75	.....	18.75	.....	.....
.....	750.00	.....	750.00	.....	.....
.....	705.00	.....	705.00	.....	.....
.....	705.00	.....	705.00	.....	.....
.....	937.50	.....	937.50	.....	.....
.....	7,500.00	$3,780.00	10,600.00	.....	$680.00
.....	937.50	.....	937.50	.....	.....
.....	888.75	.....	888.75	.....	.....
.....	$13,815.00	$3,780.00	$16,915.00	.....	$680.00
$66,826.04	$16,008.75	$150.00	$9,462.00	.....	$73,522.79
5,775.27	1,140.00	.....	600.00	.....	6,315.27
2,357.04	110.50	.....	.....	.....	2,467.54
3,061.62	405.00	.....	350.00	.....	3,116.62
4,805.43	555.00	.....	450.00	.....	4,910.43
2,639.79	281.25	.....	250.00	.....	2,671.04
1,214.50	4,102.50	.....	.....	.....	5,317.00
59.50	753.75	.....	.....	.....	813.25
5,388.08	446.25	.....	.....	.....	5,834.33
2,011.26	262.50	.....	.....	.....	2,273.76
919.68	1,428.75	.....	.....	.....	2,348.43
17.50	112.50	.....	.....	.....	130.00
936.38	258.75	.....	.....	.....	1,195.13
6,165.55	982.50	.....	100.00	.....	7,048.05
2,109.79	125.00	.....	.....	.....	2,234.79
1,356.91	427.50	.....	.....	.....	1,784.41
4,020.73	510.00	.....	450.00	.....	4,080.73
1,154.30	416.25	.....	100.00	.....	1,470.55
3,503.50	3,840.00	.....	2,000.00	.....	5,343.50
962.06	412.50	.....	.....	.....	1,374.56
48,603.50	17,160.00	.....	22,400.00	.....	43,363.50
794.22	405.00	.....	.....	.....	1,199.22
88,870.23	19,772.00	27.30	14,005.74	.....	94,663.79
.....	.....	.....	.....	.....	.....
$253,552.88	$69,916.25	$177.30	$50,167.74	.....	$273,478.69

REPORT OF THE TREASURER

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — *(Continued)*

		PRINCIPAL			
	UNDERGRADUATE SCHOLARSHIPS	*Balance, June 30, 1946*	*Gifts and Other Receipts*	*Expended or Transferred*	*Balance June 30, 1947*
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	35,890.37	.....	.....	35,890.37
361	Billings Student	50,000.00	.....	.....	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	10,0000.0	.....	.....	10,000.00
369	Albert G. Boyden	570,835.26	579.23	.....	571,414.49
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	.....	.....	2,265.07
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
383	Class of 1909	3,667.11	251.47	.....	3,918.58
385	Class of 1922	4,170.00	16,215.88	.....	20,385.88
387	Class of 1922, Special	4,800.00	.....	.....	4,800.00
389	Class of 1938	705.78	194.51	.....	900.29
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	138,081.62	.....	.....	138,081.62
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 Messinger 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	72,914.30	2,482.13	.....	75,396.43
435	James H. Haste	241,074.18	.....	.....	241,074.18

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (*Continued*)

Unexpended Balance June 30, 1946	*Investment Income*	*Other Income*	*Expended*	*Transferred*	*Unexpended Balance June 30, 1947*
		INCOME AND EXPENDITURES			
$73.62	$18.75	.....	.....	.....	$92.37
59.33	183.75	.....	$150.00	.....	93.08
129.64	86.25	.....	.....	.....	215.89
2,703.49	1,436.25	.....	300.00	.....	3,839.74
464.49	1,833.75	.....	1,600.00	.....	698.24
.....	157.50	.....	.....	.....	157.50
210.90	371.25	.....	300.00	.....	282.15
89.60	367.50	.....	325.00	.....	132.10
81,018.86	24,356.25	.....	3,643.08	.....	101,732.03
314.21	228.75	.....	200.00	.....	342.96
683.59	933.75	.....	800.00	.....	817.34
110.71	86.25	.....	75.00	.....	121.96
241.22	187.50	.....	150.00	.....	278.72
871.50	952.50	.....	.....	$1,824.00	.....
4,269.31†	345.00	.....	.....	.....	4,614.31†
908.66	176.25	.....	.....	.....	1,084.91
969.38	513.75	.....	4.12	.....	1,479.01
.....	.....	.....	.....	.....	.....
203.14	37.50	.....	.....	.....	240.64
221.76	187.50	.....	199.00	.....	210.26
5,800.73	1,522.50	.....	1,200.00	.....	6,123.23
8,169.95	5,441.25	.....	1,200.00	.....	12,411.20
1,460.39	967.50	.....	650.00	.....	1,777.89
210.83	138.75	.....	.....	.....	349.58
28,263.27	2,887.50	.....	1,800.00	.....	29,350.77
174.98	187.50	.....	150.00	.....	212.48
219.63	1,458.75	.....	1,300.00	.....	378.38
28.68	105.00	.....	75.00	.....	1.32
505.09	1,833.75	.....	1,600.00	.....	738.84
3,026.35	3,787.50	.....	3,400.00	.....	3,413.85
254.59	191.25	.....	150.00	.....	295.84
94.47	183.75	.....	150.00	.....	128.22
49.00	127.50	.....	100.00	.....	76.50
51.25	41.25	.....	.....	.....	92.50
5,616.43	3,453.75	.....	3,000.00	.....	6,070.18
385.25	390.00	.....	.....	.....	775.25
304.75	375.00	.....	300.00	.....	379.75
483.50	1,995.00	.....	1,700.00	.....	778.50
668.30	2,707.50	.....	2,200.00	.....	1,175.80
23,284.98	9,596.25	.....	8,500.00	....	24,381.23

† Includes students' notes receivable.

SCHEDULE A-4 — (Continued)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (*Continued*)

		PRINCIPAL			
	UNDERGRADUATE SCHOLARSHIPS (*Continued*)	*Balance, June 30, 1946*	*Gifts and Other Receipts*	*Expended or Transferred*	*Balance, June 30, 1947*
437	Charles Hayden Memorial	$99,578.36	$421.64	.....	$100,000.00
439	Charles Hayden Memorial, Special	.....	.....	.....	.....
441	George Hollingsworth	5,000.00	.....	.....	5,000.00
443	Samuel P. Hunt	7,195.80	300.00	.....	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	10,000.00	4,000.00	.....	14,000.00
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	6,000.00	.....	.....	6,000.00
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
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
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	1,500.00	1,000.00	.....	2,500.00
493	Charles A. Richards	31,719.32	.....	.....	31,719.32
495	John Roach	6,290.20	.....	.....	6,290.20
497	William P. Ryan Memorial	3,557.42	.....	.....	3,557.42
499	John P. Schenkl	43,821.12	.....	.....	43,821.12
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*)

Unexpended Balance, June 30, 1946	*Investment Income*	*Other Income*	*Expended*	*Transferred*	*Unexpended Balance, June 30, 1947*
		INCOME AND EXPENDITURES			
.....	.....	.....	.....	.....	.....
.....	$3,952.50	$11,078.36	$2,800.00	.....	$12,230.86
$71.98	183.75	.....	150.00	.....	105.73
.....	467.25	.....	200.00	.....	267.25
39.01	108.75	.....	100.00	.....	47.76
214.83	191.25	.....	150.00	.....	256.08
2,231.99	990.00	.....	850.00	.....	2,371.99
.....	127.50	.....	.....	.....	127.50
9,342.10	611.25	.....	550.00	.....	9,403.35
81.00	453.75	.....	.....	.....	534.75
167.41	187.50	.....	150.00	.....	204.91
82.13	183.75	.....	160.00	.....	105.88
1,160.64	131.25	.....	.....	.....	291.89
337.98	86.25	.....	.....	.....	424.23
431.50	228.75	750.00	600.00	.....	810.25
.....	1,522.50	.....	.....	.....	1,522.50
9,642.88†	431.25	160.00	.....	.....	10,234.13†
708.25	2,782.50	.....	2,400.00	.....	1,090.75
125.73	93.75	.....	100.00	.....	119.48
136.05	78.75	.....	50.00	.....	164.80
59.02	183.75	.....	150.00	.....	92.77
250.15	191.25	.....	150.00	.....	291.40
309.63	191.25	.....	166.00	.....	334.88
377.28	626.25	.....	248.97	.....	.....
161.21	1,830.00	.....	1,600.00	.....	591.21
245.75	288.75	.....	250.00	.....	284.50
102.92	772.50	.....	650.00	.....	225.42
35.00	75.00	.....	.....	.....	110.00
373.97	1,166.25	.....	970.00	.....	570.22
297.51	240.00	.....	200.00	.....	337.51
1,653.84†	187.50	.....	.....	.....	1,841.34†
1,638.51	1,657.50	.....	1,225.00	.....	2,071.01
.....	.....	.....	.....	.....	.....
349.73	198.75	.....	.....	.....	548.48
122.50	378.75	.....	.....	.....	501.25
1,926.29	1,286.25	.....	600.00	.....	2,612.54
155.88	30.00	.....	.....	.....	185.88
195.87	401.25	.....	350.00	.....	247.12
160.95	93.75	.....	.....	.....	254.70
389.64	33.75	.....	23.75	.....	399.64

† 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, 1946*	*Gifts and Other Receipts*	*Expended or Transferred*	*Balance, June 30, 1947*
517	Susan Upham	$1,000.00	.....	.....	$1,000.00
519	Samson R. Urbino	1,000.00	.....	.....	1,000.00
521	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
	Funds Transferred to Current Fund Group	6,569.07	.....	$6,569.07	.....
		$2,505,853.66	$194,932.00	$6,569.07	$2,694,216.59
	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
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
563	William B. Rogers	36,499.83	.....	.....	36,499.83
565	Arthur Rotch	5,000.00	.....	.....	5,000.00
567	Arthur Rotch, Special	5,000.00	.....	.....	5,000.00
569	Henry Webb Salisbury	1,000.00	.....	.....	1,000.00
571	Samuel W. Stratton	1,880.00	.....	.....	1,880.00
	Fund Transferred to Current Fund Group	517.50	.....	$517.50	.....
		$71,239.33	.....	$517.50	$70,721.83
	MISCELLANEOUS				
575	Ednah Dow Cheney	$13,921.66	.....	.....	$13,921.66
577	Jacob and Jennie Lichter	5,276.00	$198.75	.....	5,474.75
579	Edward F. and Mary R. Miller	10,000.00	.....	.....	10,000.00
581	Alice Brown Tyler	1,559.64	.....	.....	1,559.64
		$30,757.30	$198.75	.....	$30,956.05
	Totals	$7,612,766.07	$337,386.42	$47,424.86	$7,902,727.63

(Schedule A)

ENDOWMENT FUNDS

INCOME FOR DESIGNATED PURPOSES — (*Continued*)

Unexpended Balance, June 30, 1946	*INCOME AND EXPENDITURES* — *Investment Income*	*Other Income*	*Expended*	*Transferred*	*Unexpended Balance, June 30, 1947*
$92.75	$41.25	.....	.....	.....	$134.00
57.85	37.50	.....	$50.00	.....	45.35
2,339.30	1,023.75	.....	.....	.....	3,363.05
556.00	2,182.50	.....	1,626.50	.....	.....
2.84	356.25	.....	300.00	.....	59.09
739.75	2,025.00	.....	1,700.00	.....	1,064.75
652.55	498.75	.....	675.00	.....	476.30
142.36	150.00	.....	125.00	.....	167.36
3,384.93	313.92	.....	300.00	.....	3,398.85
610.20	212.66	.....	200.00	.....	622.86
70.37	165.00	.....	150.00	.....	85.37
465.98	202.50	.....	175.00	.....	493.48
4,848.28	2,591.25	.....	2,300.00	.....	5,139.53
.....	.....	.....	.....	.....	.....
$218,414.20	$102,296.33	$11,988.36	$57,666.42	$1,824.00	$273,208.47
$1,278.68	$1,143.64	.....	.....	.....	$2,422.32
1,410.91	240.00	.....	$140.00	.....	1,510.91
294.46	26.25	.....	.....	.....	320.71
318.20	93.75	.....	20.00	.....	391.95
41.81	37.50	$24.31	20.00	.....	.....
1,259.13	150.00	.....	.....	.....	1,409.13
14,219.32†	1,830.00	15.66	.....	.....	16,064.98†
3,425.97	315.00	.....	250.00	.....	3,490.97
8,632.63	510.00	.....	250.00	.....	8,892.63
272.89	48.75	.....	.....	.....	321.64
46.87	71.25	2.96	121.08	.....	.....
.....	.....	.....	.....	.....	.....
$31,117.25	$4,466.14	$42.93	$801.08	.....	$34,825.24
$3,926.65	$667.50	.....	$667.50	.....	$3,926.65
.....	198.75	.....	.....	$198.75	.....
1,611.40	435.00	.....	.....	.....	2,046.40
413.63	75.00	.....	5.00	.....	483.63
$5,951.68	$1,376.25	.....	$672.50	$198.75	$6,456.68
$783,239.49	$341,794.66	$16,944.84	$207,501.21	$46,054.49	$888,423.29

† Includes students' notes receivable.

(Schedule A)

SCHEDULE A-5

STUDENT LOAN FUNDS

		Balance, June 30, 1946	*Gifts and Other Receipts*
582	Bursar's	$33,535.10†	$1,359.03
583	Class of 1898	11,949.58	650.00
585	Dean's	11,144.68†	804.15
587	Carl P. Dennett	1,874.33†	1.00
589	Nathan R. George	31,893.87	.....
591	Lamson-Virgin	5,014.00	3,000.00
592	Medical Department Needy Student	2,770.89†	213.75
593	Minnie Hempel Rogers	1,226.54	.....
595	Summer Surveying Camp	2,766.20	22.52
597	Technology Loan	1,824,926.35†	100,144.67
	Totals	$1,927,101.54	$106,195.12

SCHEDULE A-6

BUILDING FUNDS

PRINCIPAL AND INCOME AVAILABLE

601	Arthur J. Conner	$29,643.51	$2,000.00
603	George Eastman Buildings	78,234.72	.....
605	Matilda A. Fraser	986.48	.....
607	Gas Turbine Laboratory	205,834.50	.....
609	Charles Hayden Memorial Library	1,293,893.50	1,000,000.00
611	Hydrodynamics Laboratory and Towing Tank	29,534.17	26,666.67
613	Library Building	1,014.00	.....
615	Metals Processing Laboratory	.....	10,000.00
617	Senior House	.....	.....
619	Sloan Foundation	.....	71,667.00
621	Charles D. Waterbury	15,976.65	.....
	Totals	$1,655,117.53	$1,110,333.67

SCHEDULE A-7

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE

GENERAL PURPOSES

623	Anonymous H	$10,000.00	.....
625	Anonymous J	2,402.00	$1,000.00
627	Anonymous M	1,500.00	.....
629	Anonymous R	57,150.00	.....
631	E. B. Badger Company	10,000.00	.....
633	Edmund Dana Barbour	20,736.94	.....
635	Stephen L. Bartlett	120,053.47	4,309.25
637	Matthew C. Brush	.....	31,395.74
639	Mary A. Carleton	14,456.48	46.50
641	Helen Collamore	.....	49,500.00
643	Co-operative Foundation	1,577.44	.....
645	William S. B. Dana Fund	500.00	.....
647	Carbon P. Dubbs	5,000.00	.....
649	Erastus C. Gaffield	267,854.42	.....
651	William T. Henry	46,595.00	12,970.00

† Includes students' notes receivable.

STUDENT LOAN FUNDS

Transfers In	*Investment Income*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
$2,200.00	$1,185.00	$1,187.19	$2,200.00	$34,891.94†
.....	450.00	.....	.....	13,049.58
450.00	356.25	773.18	450.00	11,531.90†
.....	52.50	.....	.....	1,927.83†
.....	1,196.25	.....	.....	33,090.12
.....	217.50	.....	.....	8,231.50
2,490.36	.....	205.53	.....	5,269.47†
.....	45.00	.....	.....	1,271.54
60.00	105.00	.....	60.00	2,893.72†
30,801.00	41,943.17	83,157.83	29,103.88	1,885,553.48†
$36,001.36	$45,550.67	$85,323.73	$31,813.88	$1,997,711.08

(Schedule A)

BUILDING FUNDS

Principal and Income Available

.....	$1,166.25	.....	.....	$32,809.76
$65,771.07	3,881.25	.....	$73,605.83	74,281.21
.....	37.50	.....	.....	1,023.98
.....	7,717.50	.....	.....	213,552.00
.....	61,886.25	.....	60,289.75	2,295,490.00
.....	843.75	.....	19,559.53	37,485.06
.....	37.50	.....	.....	1,051.50
.....	60.00	.....	2,764.03	7,295.97
500,000.00	.....	.....	41,889.35	458,110.65
.....	.....	$65,771.07	5,895.93	.....
.....	600.00	.....	.....	16,576.65
$565,771.07	$76,230.00	$65,771.07	$204,004.42	$3,137,676.78

(Schedule A)

OTHER INVESTED FUNDS

Principal and Income Available

.....	$375.00	.....	$375.00	$10,000.00
.....	63.75	.....	63.75	3,402.00
.....	56.25	.....	56.25	1,500.00
.....	2,141.25	.....	2,141.25	57,150.00
.....	.....	.....	10,000.00	.....
.....	776.25	.....	776.25	20,736.94
.....	2,988.75	.....	74,979.94	52,371.53
.....	.....	.....	31,395.74	.....
.....	.....	.....	14,502.98	.....
.....	723.75	.....	723.75	49,500.00
.....	52.50	.....	52.50	1,577.44
.....	.....	.....	500.00	.....
.....	.....	.....	5,000.00	.....
.....	6,093.75	$88,753.03	164,143.02	21,052.12
.....	1,020.00	.....	41,020.00	19,565.00

SCHEDULE A-7 — (Continued)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

	GENERAL PURPOSES (*Continued*)	*Balance, June 30, 1946*	*Gifts and Other Receipts*
653	Ellis Hollingsworth	$10,000.00	.....
655	Abby W. Hunt	3,400.00	.....
657	Insurance Engineering	835.13	.....
659	Carrie Belle Kenney	1,000.00	.....
661	Hiram H. Logan	24,740.79	.....
663	Charles E. Merrill	2,300.00	.....
665	Alice Butts Metcalf	100,000.00	.....
667	John Wells Morss	50,000.00	.....
669	Christel Orvis	539.42	.....
671	Emerette O. Patch	2,276.61	.....
673	George A. Sloan	500.00	.....
675	Towle	10,500.00	.....
677	Charles A. Tripp	100,000.00	.....
679	Grant Walker	70,000.00	$5,500.00
681	Frank G. Webster	25,000.00	.....
683	Harry C. Wiess	.....	11,500.00
685	Miscellaneous	.....	8,900.00
	Totals	$958,917.70	$125,121.49

SCHEDULE A-8

	DEPARTMENTS AND RESEARCH		
701	Anonymous (S)	$502,234.50	.....
703	Applied Mathematics	27,578.50	.....
705	Baruch Committee on Physical Medicine	38,833.86	.....
709	A. F. Bemis Land Account	12,059.57	.....
711	Biology–Rockefeller Foundation	31,439.21	.....
713	Center of Analysis	42,745.50	.....
715	Chemical Engineering–Badger	20,350.00	.....
717	Chemical Engineering Practice	269,810.55	.....
719	Cosmic Terrestrial Research	14,332.68	$7,500.00
721	Research Laboratory of Electronics	55,167.50	.....
722	Industrial Fellowships in Electronics	.....	25,000.00
723	Food Technology	166,491.00	30,000.00
725	John A. Grimmons	9,377.56	2,453.59
727	Group Dynamics Research	55,944.31	11,250.00
729	Harvey Non-Ferrous Forgings	10,115.50	.....
731	Hayden (Dental Clinic)	4,583.84	.....
733	Industrial Economics, Graduate	20,100.80	3,500.00
735	Industrial Fellowship in Electronics	10,000.00	.....
737	Industrial Fund	285,691.87	172,456.17
739	Industrial Relations Section	221,432.08	27,220.02

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

Transfers In	*Investment Income*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
.....	.....	.....	$10,000.00	.....
.....	.....	.....	3,400.00	.....
.....	.....	.....	835.13	.....
.....	.....	.....	1,000.00	.....
.....	.....	.....	24,740.79	.....
.....	.....	.....	2,300.00	.....
.....	$2,501.25	.....	52,501.25	$50,000.00
.....	1,875.00	.....	1,875.00	50,000.00
.....	.....	.....	539.42	.....
.....	.....	.....	2,276.61	.....
.....	.....	$500.00	.....	.....
.....	393.75	.....	393.75	10,500.00
.....	3,750.00	.....	3,750.00	100,000.00
.....	2,655.00	.....	2,655.00	75,500.00
.....	.....	.....	25,000.00	.....
.....	37.50	.....	37.50	11,500.00
$500.00	187.50	.....	187.50	9,400.00
$500.00	$25,691.25	$89,253.03	$477,222.38	$543,755.03
				(Schedule A)
.....	$18,832.50	.....	.....	$521,067.00
.....	1,035.00	.....	.....	28,613.50
.....	.....	$38,833.86	.....	.....
.....	.....	759.57	.....	11,300.00
.....	.....	31,439.21	.....	.....
.....	588.75	17,000.00	.....	26,334.25
.....	761.25	.....	$336.00	20,775.25
.....	10,117.50	.....	10,000.00	269,928.05
.....	663.75	.....	.....	22,496.43
$1,500.00	2,085.00	.....	.....	58,752.50
10,000.00	326.25	.....	2,100.00	33,226.25
.....	5,276.25	55,000.00	768.85	145,998.40
.....	386.25	.....	.....	12,217.40
.....	2,261.25	.....	32,786.86	36,668.70
.....	378.75	.....	.....	10,494.25
.....	172.50	.....	1,660.00	3,096.34
.....	768.75	.....	.....	24,369.55
.....	.....	10,000.00	.....	.....
.....	9,952.50	60,821.00	3,959.00	403,320.54
250.00	8,666.25	.....	65,803.91	191,764.44

SCHEDULE A-8 — (Continued)
OTHER INVESTED FUNDS
PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

	DEPARTMENTS AND RESEARCH (*Continued*)	*Balance, June 30, 1946*	*Gifts and Other Receipts*
741	Instrumentation Fund	$389,301.00	.....
743	A. Norton Kent	423.75	$100.00
747	Mathematics Statistical Research	8,827.25	.....
749	John Lawrence Mauran	3,395.24	.....
751	Susan Minns	40,000.00	.....
753	Forris Jewett Moore	28,649.50	.....
755	Nuclear Science and Engineering Fund	.....	15,000.00
757	F. Ward Paine	10,685.50	.....
759	Radioactivity Center	53,445.00	.....
761	Richards Memorial	959.05	.....
763	W. T. Sedgwick	57,129.94	.....
765	Servomechanism Laboratory	27,585.50	.....
767	Servomechanism Research Fund	.....	50,000.00
769	Sloan Automotive Laboratory	4,703.92	.....
771	Special Research, Padelford	2,664.42	.....
773	Submarine Signal Co.	26,067.70	.....
775	Henry N. Sweet	10,709.47	.....
777	Swift Amino Acid Fund	.....	15,000.00
779	Swift Protein Research	21,719.75	.....
781	Nellie Florence Treat	630.50	.....
783	Twentieth Century–Fox Film Corporation Research	.....	2,500.00
785	William Lyman Underwood	13,447.92	.....
		$2,498,634.24	$361,979.78
	LIBRARY		
791	Boston Stein Club	$15,565.00	$3,058.66
793	Frank Harvey Cilley	82,455.30	.....
795	Class of 1874	276.30	.....
797	Arthur Elson	533.75	.....
799	Library Growth	12,348.50	.....
		$111,178.85	$3,058.66
	MISCELLANEOUS FUNDS AND DEPOSITS		
801	Albert	$2,280.50	$3,000.00
803	Bess Bigelow	35,041.74	.....
805	Davis R. Dewey Memorial	557.20	.....
807	Drama Club Theatre	533.64	.....
809	Oscar H. Horovitz	.....	1,000.00
811	Kurrelmeyer	1,938.29	20.00
813	Arthur D. Little Memorial Lectureship	6,414.50	.....
815	M. I. T. Alumni 1940–1947	473,509.81	75,233.39
819	M. I. T. Alumni 1947–1948	.....	116,177.44
821	M. I. T. Teachers Insurance	119,032.65	16,937.13

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

Transfers In	*Investment Income*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
.....	$13,421.25	$55,734.49	.....	$346,987.76
.....	.....	.....	$523.75	.....
.....	.....	8,827.25	.....	.....
.....	127.50	.....	77.98	3,444.76
.....	.....	.....	.....	40,000.00
.....	1,072.50	.....	72.30	29,649.70
.....	236.25	.....	.....	15,236.25
.....	228.75	5,000.00	.....	5,914.25
.....	1,770.00	.....	25,000.00	30,215.00
.....	37.50	.....	.....	996.55
.....	2,133.75	.....	2,989.82	56,273.87
$10,000.00	1,488.75	.....	.....	39,074.25
.....	1,237.50	.....	3,500.00	47,737.50
.....	176.25	.....	.....	4,880.17
.....	97.50	.....	135.50	2,626.42
.....	937.50	.....	1,095.33	25,909.87
.....	401.25	.....	.....	11,110.72
.....	232.50	.....	.....	15,232.50
.....	618.75	7,000.00	.....	15,338.50
.....	22.50	.....	.....	653.00
.....	78.75	.....	.....	2,578.75
.....	502.50	.....	502.50	13,447.92
$21,750.00	$87,093.75	$290,415.38	$151,311.80	$2,527,730.59
.....	$637.50	.....	.....	$19,261.16
.....	3,026.25	$3,000.00	.....	82,481.55
.....	11.25	.....	.....	287.55
.....	18.75	.....	.....	552.50
.....	408.75	4,897.50	$951.26	6,908.49
.....	$4,102.50	$7,897.50	$951.26	$109,491.25
.....	$56.25	.....	$1,879.00	$3,457.75
.....	1,312.50	.....	.....	36,354.24
.....	22.50	.....	.....	579.70
.....	18.75	.....	.....	552.39
.....	18.75	.....	.....	1,018.75
.....	75.00	.....	.....	2,033.29
.....	198.75	.....	2,301.00	4,312.25
.....	17,295.00	$510,000.00	35,809.96	20,228.24
.....	506.25	.....	17,860.65	98,823.04
$56,677.24	4,170.00	54,024.84	12,000.00	130,792.18

SCHEDULE A-8 — (Continued)

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

		Balance, June 30, 1946	*Gifts and Other Receipts*
	MISCELLANEOUS FUNDS AND DEPOSITS (*Continued*)		
823	John D. Mitsch Memorial	$2,192.50	$360.00
825	Henry A. Morss Nautical	2,449.90	.....
827	Charles Francis Park Memorial	.....	5,500.00
829	President's Fund, Special	11,036.11	.....
831	William Patrick Ryan, Special	1,361.56	.....
833	Sedgwick Memorial Lecture	15,513.07	187.09
835	Tau Beta Pi Memorial Scholarship	.....	1,245.50
837	Teachers' Fund	125,461.89	.....
839	Technology Press	49,347.09	32,865.03
841	Towle Lecture Fund	.....	1,000.00
		$846,670.45	$253,525.58
	RESERVES		
851	Army and Navy Training Schools	$28,779.80	.....
861	Photo Service	22,139.00	.....
863	Use of Facilities	430,037.27	$261,800.00
865	Walker Memorial	12,622.00	.....
867	Walker Memorial Dining Service	43,003.10	.....
		$536,581.17	$261,800.00
	Totals	$3,993,064.71	$880,364.02

SCHEDULE A-9

DEPOSITS AND ADVANCES HELD FOR INVESTMENT

	ALUMNI AND CLASS FUNDS		
881	Class of 1887	$4,024.86	.....
883	Class of 1889	.....	$171.88
885	Class of 1914	942.87	.....
887	Class of 1918, Organ	1,862.63	.....
889	Class of 1919, Special	3,441.00	.....
891	Class of 1920	4,053.25	94.00
893	Class of 1921	3,975.50	380.00
895	Class of 1923	16,627.44	1,167.59
897	Class of 1924, Anonymous	2,803.02	.....
899	Class of 1924	28,615.33	445.05
901	Class of 1925	17,709.20	365.41
903	Class of 1926	25,209.58	6,274.70
905	Class of 1927	21,885.31	.....
907	Class of 1928	43,462.65	44.32
909	Class of 1929	17,630.04	4.11
911	Class of 1930	14,570.88	.....
913	Class of 1934	622.29	65.09
915	Class of 1934, Special	752.00	.....
917	Class of 1935	459.20	.....
919	Class of 1936	722.42	380.60

OTHER INVESTED FUNDS

PRINCIPAL AND INCOME AVAILABLE — (*Continued*)

Transfers In	*Investment Income*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
.....	$82.50	.....	.....	$2,635.00
.....	75.00	.....	$1,900.00	624.90
.....	86.25	.....	.....	5,586.25
.....	412.50	.....	.....	11,448.61
.....	37.50	.....	745.00	654.06
.....	585.00	.....	.....	16,285.16
.....	.....	.....	124.27	1,121.23
.....	4,627.50	.....	6,700.00	123,389.39
.....	2,437.50	.....	2,108.22	82,541.40
.....	15.00	.....	150.00	865.00
$56,677.24	$32,032.50	$564,024.84	$81,578.10	$543,302.83
.....	.....	.....	$28,779.80	.....
.....	$603.75	$6,000.00	.....	$16,742.75
.....	.....	167,300.00	378,538.36	145,998.91
.....	472.50	.....	.....	13,094.50
.....	1,612.50	.....	20,376.74	24,238.86
.....	$2,688.75	$173,300.00	$427,694.90	$200,075.02
$78,427.24	$125,917.50	$1,035,637.72	$661,536.06	$3,380,599.69

(Schedule A)

DEPOSITS AND ADVANCES HELD FOR INVESTMENT

.....	$150.00	.....	.....	$4,174.86
.....	3.75	.....	$10.00	165.63
.....	33.75	.....	.....	976.62
.....	71.25	.....	.....	1,933.88
.....	.....	.....	.....	3,441.00
.....	.....	.....	.....	4,147.25
.....	161.25	.....	.....	4,516.75
.....	633.75	.....	187.65	18,241.13
.....	105.00	.....	.....	2,908.02
.....	1,076.25	.....	153.30	29,983.33
.....	671.25	.....	97.84	18,648.02
.....	1,057.50	.....	268.56	32,273.22
.....	821.25	.....	.....	22,706.56
.....	1,631.25	.....	.....	45,138.22
.....	660.00	.....	.....	18,294.15
.....	547.50	.....	.....	15,118.38
.....	26.25	.....	.....	713.63
.....	30.00	.....	.....	782.00
.....	18.75	.....	.....	477.95
.....	37.50	.....	.....	1,140.52

SCHEDULE A-9 — (Continued)

DEPOSITS AND ADVANCES HELD FOR INVESTMENT

(Continued)

		Balance, June 30, 1946	*Gifts and Other Receipts*
	ALUMNI AND CLASS FUNDS *(Continued)*		
921	Class of 1939	$965.61	$45.31
923	Class of 1945	25.00	.....
925	Class of 1946	25.00	.....
927	Class of 1947	.....	80.00
928	Association of Class Secretaries	2,771.83	.....
929	M. I. T. Alumni Association, Permanent	105,024.87	.....
931	M. I. T. Alumni Association, Special Gifts	3,000.00	100.00
		$321,181.78	$9,618.06
	STUDENT ACTIVITIES		
951	Alpha Chi Sigma House	$4,781.02	$420.00
953	Major Briggs	36,977.67	.....
955	Lillie C. Smith	6,261.01	.....
957	Walter B. Snow	14,826.29	4,000.00
959	Technology Matrons' Teas	9,065.12	.....
961	W. B. S. Thomas	2,593.64	.....
963	Undergraduate Activities Trust	1,701.12	.....
965	Undergraduate Publications Trust	8,536.68	.....
967	Undergraduate Dues, Athletics	19,161.15	4,000.00
969	Undergraduate Dues, Reserve and Contingent	18,925.00	.....
		$122,828.70	$8,420.00
	Totals	$444,010.48	$18,038.06

SCHEDULE A-10

CONDITIONAL GIFTS

INCOME NOT YET AVAILABLE TO INSTITUTE

981	Anonymous Q	$3,427.00	$1,590.00
983	Anonymous X	18,957.62	.....
985	Avoca	76,200.00	.....
987	Joseph Hewett	213,361.44	18.70
989	George S. Witmer	68,478.48	5,110.20
	Totals	$380,424.54	$6,718.90

SCHEDULE A-11

ACCUMULATED NET GAIN ON GENERAL INVESTMENTS

995	Endowment Reserve (see Page 175)	$2,286,142.49	$170,128.99

DEPOSITS AND ADVANCES HELD FOR INVESTMENT
(*Continued*)

Transfers In	*Investment Income*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
.....	$37.50	.....	.....	$1,048.42
.....	.....	.....	.....	25.00
.....	.....	.....	.....	25.00
.....	.....	.....	.....	80.00
.....	112.50	.....	.....	2,884.33
.....	3,885.00	.....	$3,204.75	105,705.12
.....	120.00	.....	.....	3,220.00
.....	$11,891.25	.....	$3,922.10	$338,768.99
.....	$183.75	.....	$150.00	$5,234.77
.....	1,327.50	.....	2,700.00	35,605.17
.....	232.50	.....	98.40	6,395.11
.....	648.75	.....	2,000.00	17,475.04
.....	333.75	.....	311.50	9,087.37
.....	97.50	.....	105.90	2,585.24
.....	63.75	.....	.....	1,764.87
.....	318.75	.....	.....	8,855.43
.....	802.50	.....	2,310.00	21,653.65
.....	708.75	.....	.....	19,633.75
.....	$4,717.50	.....	$7,675.80	$128,290.40
.....	$16,608.75	.....	$11,597.90	$467,059.39

(Schedule A)

CONDITIONAL GIFTS
Income Not Yet Available to Institute

.....	$142.50	.....	.....	$5,159.50
.....	712.50	.....	.....	19,670.12
.....	.....	.....	.....	76,200.00
.....	7,961.50	.....	$8,005.52	213,336.12
.....	3,147.86	.....	3,212.68	73,523.86
.....	$11,964.36	.....	$11,218.20	$387,889.60

(Schedule A)

ACCUMULATED NET GAIN ON GENERAL INVESTMENTS

.....	.....	$10,113.12	$49,508.43	$2,396,649.93

(Schedule A)

SUMMARY OF FUND SCHEDULES

		Balance, June 30, 1946	*Gifts and Other Receipts*	*Investment Income*	*Transfers In*	*Transfers Out*	*Expended*	*Balance, June 30, 1947*
(A-3)	Endowment Funds — Income for General Purposes	$26,383,348.63	$1,703.56	$988,466.25	.....	$726.56	$987,739.69	$26,385,052.19
(A-4)	Endowment Funds — Income for Designated Purposes	7,612,766.07	337,386.42	.....	.....	47,424.86	.....	7,902,727.63
(A-5)	Student Loan Funds	1,927,101.54	106,195.12	45,550.67	$36,001.36	85,323.73	31,813.88	1,997,711.08
(A-6)	Building Funds — Principal and Income Available	1,655,117.53	1,110,333.67	76,230.00	565,771.07	65,771.07	204,004.42	3,137,676.78
	Other Invested Funds — Principal and Income Available:							
(A-7)	For General Purposes	958,917.70	125,121.49	25,691.25	500.00	89,253.03	477,222.38	543,755.03
(A-8)	For Designated Purposes	3,993,064.71	880,364.02	125,917.50	78,427.24	1,035,637.72	661,536.06	3,380,599.69
(A-4)	Unexpended Balances of Endowment Funds — Income for Designated Purposes	783,239.49	16,944.84	341,794.66	.....	46,054.49	207,501.21	888,423.29
(A-9)	Deposits and Advances held for Investment	444,010.48	18,038.06	16,608.75	.....	.....	11,597.90	467,059.39
(A-10)	Conditional Gifts — not yet available to Institute	380,424.54	6,718.90	11,964.36	.....	.....	11,218.20	387,889.60
(A-11)	Accumulated Net Gain on General Investments	2,286,142.49	170,128.99	.....	.....	10,113.12	49,508.43	2,396,649.93
	Total	$46,424,133.18	$2,772,935.07	$1,632,223.44	$680,699.67	$1,380,304.58	$2,642,142.17	$47,487,544.61
(Page 175)	Undistributed Income			13,518.78				(Schedule A)
				$1,645,742.22				
				(Schedule B)				

SCHEDULE A-12

STUDENTS' NOTES RECEIVABLE

Fund	*Notes Receivable June 30, 1946*	*Loans Made 1946–47*	*Loans Repaid 1946–47*	*Notes Receivable June 30, 1947*	*Interest Received 1946–47*
Technology Loan	$422,564.20	$28,977.00	$83,157.83*	$368,383.37	$8,237.97
Bursar's	2,037.10	2,200.00	1,187.19	3,049.91	101.84
Roger's	1,801.75	.....	171.75	1,630.00	15.66
Dean's	1,655.06	450.00	773.18	1,331.88	30.97
Summer Surveying Camp	.....	60.00	.....	60.00	.....
Dennett	465.00	.....	.....	465.00	1.00
May Scholarship	3,200.00	.....	1,150.00	2,050.00	.....
Medical Needy Student	2,770.89	.....	205.53	2,565.36	8.22
Class of 1896	625.00	.....	625.00	.....	.....
Emerson	300.00	.....	.....	300.00	.....
Ryan Memorial	205.69	.....	.....	205.69	.....
Totals	$435,624.69	$31,687.00	$87,270.48*	$380,041.21	$8,395.66
				(Schedule A)	

* Includes Written Off.

SCHEDULE A-13

ACCOUNTS RECEIVABLE

United States Government:		
O.S.R.D. — Radiation Laboratory	$40,565.18	
Less Advance Payments thereon	26,868.91	$13,696.27*
All Other O.S.R.D. Contracts		525.68*
Army, Navy and N.A.C.A. Research Contracts		1,145,544.59*
Veterans Administration		77,605.96
Navy — Radar School		49,591.17
Other Tuition Fees		66,144.91
Total United States Government		$1,353,108.58
Industrial Corporations — Research Contracts		33,485.27*
Others:		
Aeronautical Engineering Department — Wind Tunnel Accounts	$13,390.78	
Foundry Educational Foundation	10,375.17	
Physics Department — Cyclotron Rental	793.00	
Students' Fees and Deposits	919.04	
Old Colony Trust Co., Securities sold, June 30, 1947	120,467.18	
Miscellaneous Accounts	41,223.29	187,168.46
Total (Schedule A)		$1,573,762.31

* Total under direction of Division of Industrial Coöperation $1,193,251.81.

SCHEDULE A-14

CONTRACTS IN PROGRESS

United States Government:	
O.S.R.D. — Radiation Laboratory	$422.92*
Army, Navy and N.A.C.A. Research Contracts	1,265,446.44*
Weather Bureau Research Program	2,669.86
Total United States Government	$1,268,539.22
Industrial Corporations — Research Contracts	82,269.78*
Rockefeller Foundation Research	46,668.59
Costs unallocated in above accounts, represented by Accounts Payable and Accrued Wages	282,305.91
Other	2,877.38
Total (Schedule A)	$1,682,660.88

*Total under direction of Division of Industrial Coöperation $1,348,139.14.

SCHEDULE A-15

INVENTORIES, PREPAID EXPENSES AND DEFERRED CHARGES

Inventories:		
Department of Buildings and Power:		
Maintenance Supplies	$41,061.64	
Coal	21,692.87	
Oil	3,313.49	
	$66,068.00	
Laboratory Supplies	60,584.61	
Dining Halls, Food and Supplies including Games Dept.	17,383.47	
Photographic Merchandise and Supplies	9,693.00	
Dormitories, Room Service Supplies	11,686.51	
Stationery and Stamps	2,260.05	
Technology Store, Lecture Notes	1,134.00	
Total Inventories		$168,809.64
Prepaid Expenses and Deferred Charges:		
Deposits with Mutual Fire Insurance Companies	$103,241.60	
Unexpired Insurance Premiums	11,838.23	
Coöperative Foundation Plan — Insurance Premiums	5,324.36	
Building 18 used by Radar School, less Amortization	18,232.75	
Barracks Dormitories, less Amortization	86,990.57	
Westgate West, less Amortization (F.P.H.A. Project)	119,613.56	
Nuclear Science and Engineering Building (under construction)	10,747.11	
Equipment acquired by Division of Industrial Coöperation, less Depreciation	51,083.32	
Division of Industrial Coöperation:		
Due from Vendors $997.37		
Deferred Charges to Operations 50,760.18		
	51,757.55	
Other Deferred Charges (principally accounts payable and accrued wages for construction in progress)	189,559.58	
Total Prepaid Expenses and Deferred Charges		648,388.63
Total (Schedule A)		$817,198.27

SCHEDULE A-16

STUDENTS' ADVANCE FEES AND DEPOSITS

1947 Summer Term:		
Tuition Fees	$151,688.33	
Students' Deposits	8,345.00	
Dormitory Rentals	79,375.00	
Summer Surveying Camp	4,740.00	
		$244,148.33
1946–47 Students' Deposits, Returnable		25,773.30
1947–48 Tuition Fees		1,050.00
Total (Schedule A)		$270,971.63

SCHEDULE A-17

FEDERAL TAX WITHHOLDINGS, SAVINGS BOND AND OTHER DEPOSIT ACCOUNTS

	Balance, June 30, 1946	*Additions*	*Deductions*	*Balance, June 30, 1947*
Additional Group Insurance	$688.54	$16,096.92	$16,187.54	$597.92
Blue Cross Hospitalization Program	5,617.80	43,390.15	42,877.80	6,130.15
Boat House Equipment Account	2,589.02	4,324.90	6,657.32	256.60
Building Key Account	2,782.68	725.19	.....	3,507.87
Carnegie Foundation Pension Account	.....	61,445.06	61,445.06	.....
Consolidated Vultee Aircraft Corporation	6,260.00	.....	750.00	5,510.00
Corporation Flower Fund	60.00	.....	21.32	38.68
Division of Industrial Coöperation Research	.....	96,109.05	.....	96,109.05
Division of Industrial Coöperation A.M.P.Royalty Account	7,800.84	284.15	546.06	7,538.93
Division of Industrial Coöperation No. 5973 Key Account	265.93	.....	265.93	.....
Employees' Fund	85.35	.....	85.35	.....
Employees' Union Dues	.....	4,423.50	4,423.50	.....
Faculty Flower Fund	229.25	.....	97.00	132.25
Greater Boston Community Fund	.....	684.00	684.00	.....
I.C.Y.R.A. Deposit Account	1,968.99	100.00	121.95	1,947.04
Iraqi Education Directorate Account	2,625.57	2,500.00	3,430.00	1,695.57
Lowell Institute	.....	2,615.10	2,615.10	.....
Leon M. Mack Memorial	1,152.54	.....	1,152.54	.....
M. I. T. Physical Electronics Conference	.....	822.67	805.05	17.62
Melvin Trust Scholarships	1,570.00	9,800.00	1,570.00	9,800.00
Nautical Association	366.00	1,217.00	1,092.00	491.00
Radar School Harbor Building	.....	391,174.81	341,985.19	49,189.62
Rockefeller Foundation Emergency O.F.S.Expense Account	1,204.52	36.76	1,241.28	.....
Teagle Foundation, Inc. Scholarships	375.00	3,775.00	3,800.00	350.00
Technology Christian Association	3.00	651.23	654.23	.....
Travel Suspense Account	.....	43,777.66	43,777.66	.....
Undergraduate Dues	4,300.70	36,477.00	40,777.70	.....
United States Savings Bonds	18,990.10	114,873.25	121,249.16	12,614.19
United States Withholding Tax	88,736.14	1,083,201.26	1,079,544.52	92,392.88
United States Government Contract No. W218 TNG(SC1)34	.....	21,080.00	21,080.00	.....
United States Government Contract No. W218 TNG(SC1)40	.....	14,360.00	14,360.00	.....
United States Government Contract No. W218 TNG(SC1)41	.....	1,360.00	1,360.00	.....
United States Government Contract No. W30-093 S(AA1)-2	.....	3,725.00	3,725.00	.....
United States Government Contract Noa(S)-8616(E3a and E3P)	.....	1,254.92	1,254.92	.....
U. S. Navy V-5 Program	.....	2,719.90	2,719.90	.....
U. S. Navy Aviation Armament	.....	107.57	107.57	.....
U. S. Navy Ordnance Eng. Aviation	.....	80.77	80.77	.....
Veterans' Administration	.....	2,249,679.01	2,249,679.01	.....
War Reserve — Payable to U. S. Treasury	.....	324,993.61	50,991.00	274,002.61
	$147,671.97	$4,537,865.44	$4,123,215.43	$562,321.98

(Schedule A)

SCHEDULE A-18

UNEXPENDED BALANCES OF GIFTS AND OTHER RECEIPTS FOR CURRENT PURPOSES

Department Accounts	*Balance June 30, 1946*	*Receipts*	*Credit Transfer*	*Debit Transfer*	*Expense*	*Balance June 30, 1947*
Aeronautical Engineering:						
Aerodynamic Research	$25,267.88	.....	.....	.....	.....	$25,267.88
Elastic Research Lab. Alt. Spec. 2246	.....	.....	$10,000.00	.....	$7,195.00	2,805.00
C. A. A. Pilot Training Program	6,000.00	.....	.....	.....	6,000.00	.....
Five Foot Wind Tunnel	30,000.00	.....	16,000.00	1,494.60	9,872.88	34,632.52
Goodyear Fellowship	.....	.....	6,788.50*	.....	750.00	6,038.50
Instrument Laboratory Maintenance	.....	$60.00	34,468.51	.....	30,174.58	4,353.93
Special 500–762 Account, Draper	1,468.51	.....	.....	1,468.51	.....	.....
Special Apparatus Wright Tunnel	10,000.00	.....	.....	.....	.....	10,000.00
Special Appro. No. 1938	185.99	.....	114.52	.....	300.51	.....
Special Appro. No. 1990	4,299.45	.....	46.26	.....	24.83	4,320.88
Special Appro. No. 2065	4,246.26	.....	.....	.....	304.24	3,942.02
Sperry Gyroscope Fund	.....	.....	5,259.75*	.....	.....	5,259.75
Structural Lab. Equipment	.....	.....	500.00	.....	221.71	278.29
Vibration Res. No. 1333	157.46	25.00	500.00	.....	601.94	80.52
Wind Tunnel	81,150.59	81,274.50	1,494.60	38,621.57	63,646.27	61,651.85
Wright Tunnel Balance	30,000.00	.....	.....	.....	.....	30,000.00
Architecture:						
Special Appro. No. 2238	.....	.....	6,000.00	.....	949.09	5,050.91
Special Appro. No. 2239	.....	.....	1,620.36	.....	1,620.36	.....
Special Appro. No. 2282	.....	.....	3,500.00	.....	25.50	3,474.50
Housing Research Special No. 1899	3,306.34	.....	.....	.....	459.00	2,847.34
Traveling Fellowship	1,500.00	.....	.....	.....	.....	1,500.00
Ralph Walker Fund	.....	250.00	.....	.....	250.00	.....
Biology and Biological Engineering:						
American Cancer Society	.....	6,872.40	1,017.60	29.65	7,860.35	.....
Cancer Society Denues	.....	500.00	.....	.....	.....	500.00
Armour & Co. Research — Waugh	.....	12,210.21	29.65	256.43	10,724.36	1,259.07
Equipment Special No. 2247	.....	.....	8,000.00	.....	3,125.80	4,874.20
Biological Shop Account	.....	.....	1,000.00	.....	984.56	15.44
Biological Shop Spec. Appro. No. 1648	646.13	.....	1,097.15	.....	1,743.28	.....
Baruch Fund	.....	.....	38,941.64	561.21	11,768.58	26,611.85
Baruch Comm. on Physical Medicine Fellowship	161.73	900.21	.....	.....	875.00	186.94
Corn Industries Research Found.	371.25	10,700.00	.....	100.00	4,773.44	6,197.81
Electron Microscope Research	.....	.....	31,439.21	.....	15,166.01	16,273.20
Gillette Safety Razor Co.	15,000.00	.....	.....	.....	14,850.00	150.00
A. C. Lawrence Fund	4,209.08	.....	.....	.....	3,150.00	1,059.08
Lilly P. I. Fund	3,385.91	.....	.....	.....	1,269.13	2,116.78
Penicillin Special	.....	.....	361.21	361.21	.....	.....
Rockefeller Fund for Biological Eng.	7,621.16	.....	46,668.59	1,397.24	52,892.51	.....
Rubber Research Special 1915	533.81	.....	.....	244.01	289.80	.....
Submarine Signal Fund	.....	.....	1,095.33	.....	1,095.33	.....
Building Engineering and Construction:						
Cabot Pigment Research	541.94	7,000.00	.....	.....	6,253.47	1,288.47
National Lime Association	753.38	5,000.00	.....	.....	5,240.24	513.14
Plastics Materials Manufacturers Assoc.	17,850.06	30,000.00	.....	.....	37,797.19	10,052.87
Research Corporation Building Material	2,353.34	.....	.....	.....	689.08	1,664.26
Reynolds Metals	1,666.37	.....	.....	1,666.37	.....	.....
Tucker (Ross Francis) Memorial Fund	81.76	.....	23.82	.....	15.90	89.68

* Transferred from Major Funds.

SCHEDULE A-18 — (Continued)

Department Accounts (Continued)	Balance June 30, 1946	Receipts	Credit Transfer	Debit Transfer	Expense	Balance June 30, 1947
Business and Engineering Administration:						
Alvin Brown Fund	.....	$500.00	.....	.....	.....	$500.00
Case Research	$29.35	.....	.....	$29.35	.....	.....
R. E. Gillmor Fund	.....	1,500.00	.....	.....	$1,000.00	500.00
Human Relationships Account	31.02	.....	.....	.....	.40	30.62
John R. Macomber Fund	498.88	.....	.....	.....	498.88	.....
Newman M. Marsilius Fund	795.18	1,500.00	.....	.....	2,295.18	.....
Office of Emergency Management Spec. A-35	295.63	.....	$64.56	.....	360.19	.....
Puerto Rico Fellowships	298.55	.....	.....	.....	298.55	.....
Sloan Book Account	231.65	.....	.....	.....	.....	231.65
Special Appro. No. 1850	450.20	4.27	.....	.....	.....	454.47
Special Appro. No. 1931	323.51	.....	.....	.....	301.40	22.11
Sponsored Fellowship, Operating	2,612.10	.....	.....	.....	174.63	2,437.47
Sponsored Fellowship, Research	2,351.54	1.00	.....	.....	.....	2,352.54
Standard Oil of Cal. Fellowship	.....	1,600.00	.....	.....	1,600.00	.....
Howard D. Williams Fund	.....	500.00	.....	.....	476.11	23.89
Chemical Engineering:						
Allied Chemical & Dye Corp. Fellowship	.....	3,600.00	.....	.....	3,300.00	300.00
Alsifilm Research	199.86	.....	.....	.....	.....	199.86
Colloid Chemistry Special 1207	281.28	.....	.....	.....	.....	281.28
du Pont Fellowship	.....	2,800.00	.....	.....	2,400.00	400.00
Eastman Kodak Fellowship	.....	1,200.00	1,028.00*	.....	2,200.00	28.00
Equipment, Special	215.00	.....	.....	215.00	.....	.....
Fuels Research	2,354.26	.....	.....	.....	.....	2,354.26
Humble Oil & Refining Co. Fellowship	.....	6,250.00	.....	.....	.....	6,250.00
S. C. Johnson & Son Colloid Chem. Fellowship	4,252.50	.....	.....	.....	1,400.00	2,852.50
Kimberly Clark Corp. Fellowship	.....	3,700.00	.....	.....	1,800.00	1,900.00
Thomas Midgley, Jr. Fellowship	.....	500.00	507.00*	.....	.....	1,007.00
Pan American Refining Corp. Fellowship	.....	3,100.00	.....	.....	1,200.00	1,900.00
Paint Films Special No. 1992	2,760.02	.....	.....	.....	.....	2,760.02
Procter & Gamble Fellowship	.....	3,000.00	.....	.....	600.00	2,400.00
Pittsburgh Consolidation Coal Co. Fellowships	.....	3,000.00	.....	.....	480.00	2,520.00
Research Corp. Special McAdams	2,833.36	.....	9.89	1,085.67	1,757.58	.....
Standard Oil of Indiana Fellowship	900.00	3,700.00	.....	.....	2,700.00	1,900.00
Standard Oil of California Fellowship	1,000.00	600.00	.....	.....	1,300.00	300.00
Standard Oil Development Co. Research	.....	.....	18,848.51	.....	3,207.66	15,640.85
Special Research No. 1421	250.00	138.40	.....	.....	.....	388.40
Special Appropriation No. 2131	.....	.....	833.45	.....	833.45	.....
Chemistry:						
American Academy of Arts and Sciences	300.00	4,000.00	.....	.....	278.00	4,022.00
Alterations Special No. 2195	.....	.....	100,000.00	.....	94,205.37	5,794.63
Abbott Laboratories	.....	.....	5,215.32*	.....	958.30	4,257.02
Anonymous	$3,500.00	.....	.....	.....	3,500.00	.....

* Transferred from Major Funds.

SCHEDULE A-18 — (Continued)

Department Accounts (Continued)	Balance June 30, 1946	Receipts	Credit Transfer	Debit Transfer	Expense	Balance June 30, 1947
Chemistry: (Continued)						
Bristol Laboratories Research	.....	$3,450.00	.....	.....	$112.23	$3,337.77
Cope Research	$5,750.00	.....	.....	.....	1,450.00	4,300.00
Diamond Alkali Special No. 2126	1,009.04	4,000.00	$153.20	.....	5,162.24	.....
Harshaw Chemistry Fund	4,286.68	.....	.....	.....	1,693.63	2,593.05
du Pont Fellowship	.....	11,200.00	.....	.....	6,741.58	4,458.42
du Pont Peroxide Research	.....	2,000.00	.....	.....	.....	2,000.00
Hockett Fund	.....	1,273.70	.....	$1,273.70	.....	.....
Inorganic Equipment Account	722.79	.....	.....	722.79	.....	.....
Little, A. D. Special Fellowship 45–46	1,000.00	850.00	1,000.00	.....	2,350.00	500.00
Little, A. D. Special Fellowship 46–47	.....	.....	6,600.00	.....	4,200.00	2,400.00
Physical Chemistry Royalties	5,583.75	1,978.97	.....	.....	2,055.26	5,507.46
Polymerization Research	1,665.25	.....	.....	.....	.....	1,665.25
Procter & Gamble Fund	.....	2,700.00	.....	.....	.....	2,700.00
Rockefeller Research Grant 45107	19,736.65	5,000.00	825.00	.....	5,801.67	19,759.98
Research Corp. Morton Fund	8,630.44	5,000.00	.....	.....	3,009.45	10,620.99
Research Corp. Vitamins A & D. Research	930.19	2,000.00	332.95	.....	3,263.14	.....
Royalty Receipts Pat. 665135	3,629.71	.....	.....	332.95	723.25	2,573.51
Sharpe and Dohme, Inc.	.....	3,200.00	.....	.....	3,000.00	200.00
Socony Vacuum Oil Co. Fellowship	.....	4,000.00	.....	.....	2,000.00	2,000.00
Special Appro. No. 2048 Freshman Laboratories	10,322.68	.....	.....	.....	1,235.34	9,087.34
Chemistry Special No. 2100	5,554.87	.....	.....	.....	5,542.43	12.44
Chemistry Special No. 2170A	75,960.55	.....	11,560.13	.....	87,520.68	.....
Chemistry Special No. 2170B	41,491.63	.....	.....	.....	39,913.60	1,578.03
Special Appro. No. 2245A	.....	.....	60,000.00	21,560.13	29,547.33	8,892.54
Special Appro. No. 2245B	.....	.....	10,000.00	.....	8,917.78	1,082.22
Sugar Research Fund	2,124.76	26,884.82	.....	.....	19,579.74	9,429.84
Swift Amino Acid Fund	.....	5,000.00	.....	.....	1,883.94	3,116.06
Swift Protein Research	.....	.....	7,000.00	.....	4,831.86	2,168.10
Union Bay State — Milas	.....	500.00	.....	.....	.....	500.05
U. S. Rubber Co. Fellowship	.....	2,800.00	.....	.....	.....	2,800.04
Welch Fund	111.78	1,000.00	.....	825.00	136.53	150.20
Civil Engineering:						
Cement Research Special 1056	1,397.44	.....	.....	1,397.44	.....	.....
Welding Research	1,600.00	.....	.....	.....	1,196.72	403.28
Equipment Special 1326	338.82	.....	.....	.....	.....	338.82
Freeman Hydraulic Research	800.00	.....	.....	.....	.....	800.00
Hydraulics Laboratory Special No. 2155	6,219.31	.....	670.06	.....	4,517.13	2,372.24
Retaining Wall Laboratory Special	200.00	.....	.....	200.00	.....	.....
River Hydraulic Laboratory	1,184.39	.....	236.88	.....	1,421.27	.....
Sanitary Engineering Lab. 2032	.....	.....	2,092.00	.....	2,092.00	.....
Sanitary Science Lab. Special No. 2087	8,445.17	70.00	1,000.00	.....	8,240.43	1,274.74
Soil Mechanics Laboratory	464.80	11.10	239.68	.....	715.58	.....
Sanitary Science Laboratory Spec. No. 2173	15,000.00	.....	.....	.....	4,999.01	10,000.99
Special Research No. 1364	2,581.42	.....	.....	2,581.42	.....	.....
Structural Laboratory	.....	.....	906.05	.....	906.05	.....
Structural Laboratory Donations	.....	520.00	100.00	.....	438.60	181.40
Summer Camp Construction Reserve	5,282.43	.....	.....	.....	2,539.06	2,743.37
Wallace and Tiernan Grant	5,000.00	.....	.....	.....	3,021.53	1,978.47

SCHEDULE A-18—(Continued)

Department Accounts (Continued)	Balance June 30, 1946	Receipts	Credit Transfer	Debit Transfer	Expense	Balance June 30, 1947
Economics:						
Experimental Statistics	$333.00	.....	.....	$333.00	.....	.....
Rockefeller Foundation Grant 41042	.....	.....	$1,432.91	589.16	$843.75	.....
Rockefeller Foundation Grant 45082	4,289.00	$5,293.35	.....	.....	7,329.85	$2,252.50
Rockefeller Public Opinion Survey	.....	7,200.00	.....	.....	4,561.38	2,638.62
United States Steel Corp. Fund	.....	5,130.00	.....	.....	5,130.00	.....
Electrical Engineering:						
American Philosophical Society-Kopal	.....	1,200.00	.....	.....	611.44	588.56
Balsbaugh Research	5,462.28	750.00	375.00	217.54	1,152.47	5,217.27
Balsbaugh Research Special	1,567.74	.....	217.54	.....	1,785.28	.....
Center of Analysis	9,583.49	13,219.99	30,247.59	.....	52,219.32	831.75
Coating Metals Special No. 1946	598.00	.....	.....	.....	.....	598.00
Communications Lab. U. H. F. Res.	1,874.94	.....	.....	.....	1,307.40	567.54
Course Revision Special No. 1250	579.91	689.66	.....	.....	702.83	566.74
Course VI-A Travel Account	156.41	.....	1,000.00	.....	859.86	296.55
Edgerton Film Research	1,162.68	778.50	.....	.....	39.43	1,901.75
Electronics Special	658.70	.....	.....	658.70	.....	.....
High Voltage Special No. 2114	.....	397.28	3,763.07	9,423.51	*5,263.16*	.....
Hyams Radiation Research	7,259.93	630.00	6,900.00	.....	8,004.80	6,785.13
Int. Tel. & Tel. Research 1940–41	399.38	.....	.....	399.38	.....	.....
Int. Tel. & Tel. Research	865.70	.....	.....	.....	.....	865.70
Micro Calibration Research	120.90	.....	.....	120.90	.....	.....
Micro Wave Research	6,357.06	.....	.....	.....	1,607.98	4,749.08
Network Analyzer	19,579.05	8,591.32	.....	.....	5,075.57	23,094.80
Oil Gear Research	9,000.00	.....	.....	750.00	1,250.00	7,000.00
Oncologic Research	851.92	.....	51.38	.....	903.30	.....
Photoelectric Cells Res. Spec. 1874A	4,157.98	.....	.....	.....	.....	4,157.98
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
Rockefeller Electric Computer 46061	.....	50,051.65	2,585.38	.....	32,879.92	19,757.11
Round Hill Research	117.13	.....	.....	117.13	.....	.....
Servos Royalty Account	823.47	.....	.....	.....	.....	823.47
Servos Special Brown	3,262.59	187.72	10,030.00	.....	6,834.34	6,645.97
Shop Equipment Special (Lathe)	800.00	.....	.....	800.00	.....	.....
Special Appro. No. 2134	166.60	.....	46.70	213.30	.....	.....
U. H. F. Dielectrics Res. Spec. 1874B	6,000.00	.....	.....	.....	.....	6,000.00
U. S. Navy Fire Control Research	.....	.....	296.42	.....	296.42	.....
von Hippel Research Spec. No. 1219	118.89	.....	.....	118.89	.....	.....
English and History:						
International Relations Library	91.89	.....	.....	.....	7.47	84.42
Food Technology:						
Apple Fellowship	4,674.78	.....	.....	.....	2,257.27	2,417.51
Bruce's Juices Inc. Fellowship	6,000.00	.....	.....	.....	2,000.00	4,000.00
Campbell Special	195.06	.....	2,885.06	.....	581.79	2,498.33
Distillation Products Inc. Fellowship	.....	1,500.00	.....	.....	1,500.00	.....
Fat Research Fund	.....	3,000.00	.....	781.26	2,180.13	38.61

SCHEDULE A-18 — (*Continued*)

Department Accounts (Continued)	*Balance June 30, 1946*	*Receipts*	*Credit Transfer*	*Debit Transfer*	*Expense*	*Balance June 30, 1947*
Food Technology: (*Continued*)						
Food Research	.....	$645.27	$55,000.00	$9,555.06	$45,180.78	$909.43
Hoffmann La Roche Fund	$2,497.94	1,500.00	.....	.....	1,283.06	2,714.88
Joe Lowe Corp. Research	2,959.95	1,500.00	.....	.....	920.00	3,539.95
Lever Bros. Fellowship	.....	.....	781.26	225.72	555.54	.....
Moore, Emma B., Ration Research, Proctor	500.00	.....	.....	.....	.....	500.00
Moore, Emma B., Ration Research, Harris	313.17	.....	.....	.....	.....	313 17
Nutrition Research	1,513.23	2,701.70	44.23	.....	3,755.54	503.62
Pan American Fund	.....	1,608.29	.....	1,608.29	.....	.....
Quaker Nutrition Fund	2,221.39	9,600.00	.....	.....	2,918.47	8,902.92
R. R. F. Research	4,015.20	.....	.....	.....	4,015.20	.....
Royalties Receipts Pat. 665135	2,199.61	.....	.....	.....	.....	2,199.61
Standard Brands Fellowship	1,300.00	2,200.00	.....	.....	1,800.00	1,700.00
Swift Nutrition	.....	3,040.00	743.66	130.65	3,653.01	.....
United Fruit Fund	35,739.34	.....	.....	.....	16,371.90	19,367.44
Vitamin K Fund	1,333.04	.....	284.38	.....	1,617.42	.....
Geology:						
Geological Research Special 1863	4,551.38	.....	.....	.....	20.63	4,530..75
G. S. A. 452–45	392.83	3,815.00	20.48	40.00	3,253.33	934.98
G. S. A. 466–45	5,005.31	2,500.00	128.95	.....	4,871.68	2,762.58
G. S. A. 472–45	.....	2,500.00	.....	.....	1,702.50	797.50
Geophysical Research	152.05	538.10	40.00	20.48	667.88	41.79
National Research Council, Research	129.60	.....	.....	.....	.....	129.60
Owens Illinois Glass Co. Fellowship	.....	.....	5,087.50*	.....	2,006.18	3,081.32
Special Appro. No. 2229	.....	.....	5,200.00	1,500.00	716.95	2,983.05
Paine Fund Special No. 2213	.....	.....	5,000.00	128.95	2,939.33	1,931.72
Graphics:						
Special No. 2117	.....	.....	160.69	.....	160.69	.....
National Research Council Grant	.....	.....	184.21	.....	4.20	180.01
Industrial Relations:						
Special Appro. No. 1955	676.59	.....	.....	.....	.....	676.59
Mathematics:						
Applied Mathematics Program	5,592.04	457.14	.....	.....	5,394.14	655.04
Journal of Mathematics and Physics	5,159.66	2,228.05	600.00	.....	4,151.73	3,835.98
Special Appro. No. 2260	.....	.....	8,827.25	.....	36.04	8,791.21
Putnam Fund	270.52	300.00	.....	.....	61.23	509.29
Rockefeller Fund 47009	.....	2,750.00	.....	.....	150.13	2,599.87
Mechanical Engineering:						
A. S. M. E. Research	3,272.30	2,251.43	.....	.....	4,485.87	1,037.86
A. S. R. E. Research	866.41	.....	.....	.....	65.59	800.82
American Soc. of Tool Engineering	.....	.....	517.50*	.....	.....	517.50
Cavitation Research	2,007.85	275.00	.....	.....	789.07	1,493.78
Clark Thread Fellowship	.....	5,400.00	2,787.50*	.....	4,200.00	3,987.50
deForest Research Special 1254	2,252.72	1,746.00	.....	.....	1,768.12	2,230.60
du Pont Predoctoral Fellowship	.....	2,200.00	.....	.....	1,350.00	850.00

* Transferred from Major Fund.

SCHEDULE A-18 — (Continued)

Department Accounts (Continued)	Balance June 30, 1946	Receipts	Credit Transfer	Debit Transfer	Expense	Balance June 30, 1947
Mechanical Engineering: (Continued)						
Eastman Kodak Co. Fellowship...	.....	$750.00	.....	.....	$750.00	.....
Gas Turbine Building and Equipment	$301,582.71	168.03	$25,656.07	$1,932.40	301,209.89	$24,264.52
Fatigue Lab. Special No. 2224....	.....	.....	800.00	.....	285.78	514.22
Lab. Rev. Special No. 2095.....	.....	.....	2,788.67	.....	205.87	2,582.80
Machine Tool Lab. Spec. No. 2201.	.....	1,514.12	16,350.00	.....	16,001.16	1,862.96
Machine Tool Lab. Spec. No. 2280.	.....	.....	7,000.00	.....	.....	7,000.00
Magnaflux Research Fund.....	9,952.64	.....	.....	.....	1,000.00	8,952.64
Mechanics of Materials Spec. No. 2041	23,464.85	.....	.....	.....	4,018.17	19,446.68
Proprietors Locks and Canals.....	.....	.....	1,573.02	.....	.....	1,573.02
S. Slater & Sons, Inc., Fund	23,098.32	84.37	.....	200.00	13,205.18	9,777.51
Shop Maintenance Account.....	7,181.44	628.43	1,977.43	.....	6,401.83	3,385.47
Special Appro. No. 2176.....	3,135.53	44.00	750.00	.....	2,566.03	1,363.50
Special Research.....	111.86	.....	22.81	.....	134.67	.....
Testing Materials Lab. Special....	2,513.01	.....	.....	.....	778.61	1,734.40
Textile Equipment Special.....	414.26	500.00	.....	200.00	503.95	210.31
Textile Foundation Research.....	2,497.77	.....	.....	.....	44.14	2,453.63
Special Appropriation No. 2099....	10,583.26	.....	.....	.....	5,638.34	4,944.92
Special Appropriation No. 2132....	3,158.71	.....	.....	.....	2,118.39	1,040.32
Special Appropriation No. 2160...	81,861.39	.....	56,971.74	.....	138,833.13	.....
Special Appro. 2169A.....	10,144.94	.....	.....	.....	2,696.49	7,448.45
Special Appro. 2169B.....	13,987.24	.....	.....	.....	10,779.80	3,207.44
Thermodynamic Research.....	1,475.08	.....	.....	.....	203.14	1,271.94
U. S. Navy Torpedo Research....	.....	.....	157.20	.....	157.20	.....
Medical:						
Homberg Infirmary Spec. No. 1976	931.02	.....	.....	.....	62.52	868.50
Special — Needy Student Fund...	2,490.36	.....	.....	2,490.36†	.....	.....
Metallurgy:						
American Smelting & Ref. Co. Fell.	.....	3,900.00	2,514.00*	.....	2,000.00	4,414.00
Armour Dry Cyaniding.....	.....	5,000.00	.....	.....	2,761.34	2,238.66
Armour Flotation Research—Gaudin	.....	12,000.00	.....	.....	1,708.59	10,291.41
Cates Equipment Special.....	243.34	.....	.....	243.34	.....	.....
Chipman Research Spec. 1337....	415.86	.....	2,765.00	.....	1,805.38	1,375.48
Clay Research.....	783.08	.....	.....	.....	169.67	613.41
Corrosion Research.....	.....	.....	12,273.50	.....	.....	12,273.05
Dust Removal Spec. 1945.....	44.95	.....	.....	44.95	.....	.....
Engineering Foundation Welding Res.	1,609.13	9,300.00	.....	.....	7,496.03	3,413.10
Equipment Spec. No. 1234.....	2,295.46	771.14	208.76	.....	2,716.96	558.40
Equipment Special Hayward.....	49.25	.....	.....	49.25	.....	.....
Gray Iron Founders Society.....	703.00	.....	.....	.....	106.25	596.75
Loeb Foundation.....	.....	10,000.00	.....	.....	57.00	9,943.00
International Nickel Co. Fell.....	.....	2,200.00	.....	.....	.....	2,200.00
Magnet Generator Purchase Acct..	14,260.00	.....	.....	14,260.00	.....	.....
Metallurgy Special No. 2269.....	.....	.....	1,500.00	.....	1,447.23	52.77
Mineral Dressing Research.....	725.42	600.00	1,040.16	.....	2,365.58	.....
N. E. Carbide Research Assoc.,....	.....	900.00	1,396.84	$2,290.39	6.45	.....
Republic Steel Corp. Fund.....	8,701.08	10,203.50	.....	.....	9,153.71	9,750.87

* Transferred from Major Funds.

† Transferred to Major Funds (Loan Fund Group).

SCHEDULE A-18—(Continued)

Department Accounts (Continued)	*Balance June 30, 1946*	*Receipts*	*Credit Transfer*	*Debit Transfer*	*Expense*	*Balance June 30, 1947*
Metallurgy: *(Continued)*						
Revere Copper and Brass Co. Res..	$4,713.11	$1,600.00	.....	.....	.....	$6,313.11
Sheffield Foundation Research....	.....	5,260.00	$1,116.12	$165.36	$6,210.76	.....
Special Research No. 1354.....	478.53	.....	.....	478.53	.....	.....
Special Research No. 1818.....	.....	566.67	2,197.55	.....	2,764.22	.....
Titanium Co. Fund.....	.....	375.00	.....	.....	133.37	241.63
Equipment Special No. 1259.....	4,169.07	997.50	317.24	.....	4,333.21	1,150.60
Unexcelled Mfg. Co.....	.....	2,401.10	.....	187.82	1,541.60	671.68
Underwriting Spec. No. 2202.....	.....	.....	7,500.00	.....	7,500.00	.....
Vanadium Corp. Fund.....	84.85	3,830.00	.....	.....	3,309.12	605.73
Wellman, S. K. Fund.....	5,761.29	.....	.....	.....	2,776.63	2,984.66
Meteorology:						
Pamphlets Deposit Special.....	164.00	.....	.....	.....	.....	164.00
Weather Bureau Research.....	.....	10,111.68	2,669.86	2,363.85	10,417.69	.....
Military Science:						
Freshman Uniform Account.....	2,018.21	*229.16*	.....	.....	.....	1,789.05
Senior Uniform Upkeep Account...	134.97	*54.20*	.....	.....	.....	80.77
Naval Architecture:						
Propeller Tunnel Special No. 1548A	2,937.09	300.00	.....	.....	667.68	2,569.41
Vault Special No. 2212.....	.....	.....	882.99	.....	882.99	.....
Special Fund (Anonymous).....	2,189.81	.....	.....	.....	.....	2,189.81
Physics:						
Acoustics Laboratory Special No. 2115	23,208.79	455.43	10,000.00	.....	19,911.35	13,752.87
American Petroleum Institute Fund	.....	11,741.01	.....	145.39	11,545.78	49.84
Cabot X-Ray Fund.....	6,000.00	.....	.....	.....	.....	6,000.00
Carnegie Institution of Washington	860.00	.....	.....	.....	860.00	.....
Crystal Research.....	616.70	477.83	.....	.....	495.02	599.51
du Pont Fellowship.....	.....	2,200.00	.....	.....	1,200.00	1,000.00
Evans Research.....	588.19	59.00	.....	.....	245.61	401.58
Glass Industry Fellowship.....	250.00	.....	.....	.....	.....	250.00
Gulf Oil Corp. Fellowship.....	1,100.00	1,100.00	.....	.....	2,200.00	.....
Harshaw--Stockbarger.....	.....	9,000.00	.....	.....	1,321.23	7,678.77
Jewett, Frank B. Fellowship.....	1,447.07	.....	.....	.....	171.33	1,275.74
Magnetic Laboratory Special No. 1222	5,029.97	19,974.28	.....	.....	24,010.79	993.46
National Co. Electronics Fund....	1,500.00	.....	.....	1,500.00	.....	.....
Nuclear Research.....	9,423.67	47.18	.....	.....	330.39	9,140.46
Radioactivity Center.....	47,473.34	3,825.94	20,337.88	.....	16,293.25	55,343.91
Roentgen Ray Research.....	232.26	.....	.....	232.26	.....	.....
Rockefeller Foundation Grant 45050	17,808.13	80.48	600.00	.....	17,425.72	1,062.89
Special Appro. No. 2047.....	27,379.93	117.56	258.08	707.48	7,134.71	19,913.38
Special Appro. No. 2133.....	600.00	.....	.....	600.00	.....	.....
Special Appro. No. 2146.....	.....	.....	2,430.19	.....	2,430.19	.....
Special Appro. No. 2171.....	600.00	57.63	2,573.54	657.63	.....	2,573.54
Spectroscopy Research.....	.....	20,000.00	.....	.....	3.00	19,997.00
Spectroscopy Special.....	9,895.40	323.75	.....	.....	4,021.91	6,197.24
Zeeman Effect Program Special 1755	466.65	.....	.....	.....	.....	466.65

SCHEDULE A-18 — (Continued)

Department Accounts (Continued)	*Balance June 30, 1946*	*Receipts*	*Credit Transfer*	*Debit Transfer*	*Expense*	*Balance June 30, 1947*
Solar Energy Research:						
Solar Energy — Architecture	.....	.....	$1,500.00	.....	$1,500.00	.....
Solar Energy — Chemistry	$667.31	.....	.....	.....	299.30	$368.01
Solar Energy — Elec. Eng.	656.44	.....	2,000.00	.....	400.00	2,256.44
Solar Energy — Geology	485.83	.....	.....	.....	.....	485.83
Solar Energy — Headquarters	.....	$58.04	7,559.88	.....	7,617.92	.....
Solar Energy — Metallurgy	.....	.....	3,541.58	.....	3,541.58	.....
Solar Energy — Building Eng. and Const. "S"	.....	.....	13,775.91	.....	13,775.91	.....
	$1,415,051.76	$581,040.34	$805,434.06	$132,905.18	$1,677,030.49	$991,590.49
Other Accounts						
Research (other than those under Department Accounts):						
All American Aviation, Inc. Richard C. du Pont Memorial	$5,000.00	.....	.....	.....	$1,200.00	$3,800.00
Bush Research Fund	115.00	$100.00	.....	.....	.....	215.00
Cosmic Terrestrial Research	21.40	4,165.24	.....	.....	2,317.40	1,869.24
Division of Ind. Coöp. Research	60,007.68	.....	.....	$60,007.68	.....	.....
General Radio Company Fund	2,000.00	.....	.....	.....	.....	2,000.00
Chemical Warfare Service Dev. Lab.	101.76	.....	.....	.....	101.76	.....
	$67,245.84	$4,265.24	.....	$60,007.68	$3,619.16	$7,884.24
Library:						
Crafts Library	$479.53	.....	.....	.....	.....	$479.53
Biology Library	.....	.....	$1,888.16	.....	.....	1,888.16
Dewey Library	17.85	.....	.....	.....	$4.00	13.85
German Chemical Documents	2,895.15	$1,591.30	.....	.....	3,077.85	1,408.60
Humanities Library Spec. No. 2103	873.17	32.40	.....	.....	897.15	8.42
Library Growth	2,842.08	1,096.71	4,179.47	.....	6,108.11	2,010.15
Schenley Library Fellowship	3,131.79	8,000.00	.....	.....	9,353.15	1,778.64
Rockefeller Foundation Grant 46037	1,108.95	5,000.00	.....	.....	4,200.21	1,908.74
Special No. 1	442.97	1,170.65	.....	.....	123.15	1,490.47
Special No. 1853	941.73	.....	.....	.....	174.49	767.24
Special Book Purchase Account	.....	100.00	.....	.....	.....	100.00
Special Appropriation No. 2240	.....	.....	3,000.00	.....	2,812.93	187.07
Walker Memorial Library	2,615.45	.....	3,150.00	.....	3,443.41	2,322.04
	$15,348.67	$16,991.06	$12,217.63	.....	$30,194.45	$14,362.91
Miscellaneous:						
Alumni Register, 1948	.....	$10,720.50	.....	.....	$3,350.30	$7,370.20
Bulletin Board Special No. 2211	.....	.....	$2,475.00	.....	2,475.00	.....
Class of 1917	.....	.....	1,183.81*	.....	.....	1,183.81
Corporation K Fund	.....	200.00	.....	.....	64.86	135.14
Course Exhibit Special No. 2252	.....	.....	1,117.43	.....	1,117.43	.....
Dean's Fund Special	.....	1,500.00	.....	.....	900.00	600.00
Douglas Aircraft Scholarship	.....	1,500.00	.....	.....	1,500.00	.....
Richard C. du Pont Mem. Spec.	.....	.....	11,000.00	.....	2,209.58	8,790.42
Electrical Distribution Special No. 2200	.....	.....	21,287.70	.....	21,287.70	.....

* Transferred from Major Funds.

SCHEDULE A-18— (Continued)

Other Accounts (Continued)	*Balance June 30, 1946*	*Receipts*	*Credit Transfer*	*Debit Transfer*	*Expense*	*Balance June 30, 1947*
Miscellaneous: *(Continued)*						
Educational Survey Special No. 2251	.....	.....	$5,450.00	.....	$1,118.74	$4,331.26
Fund Raising Special No. 2267....	.....	.....	10,000.00	.....	9,152.00	848.00
Graduate Student Fund.....	$200.00	.....	.....	.....	38.48	161.52
Radiation Luncheon Club Schp. Fd.	345.71	$1,003.15	.....	.....	1,348.86	.....
Guide Service Special No. 1558 ...	169.80	.....	.....	$169.80	.....	.....
Gymnasium Special.....	915.53	.....	.....	.....	.....	915.53
Historic Memorials.....	.....	.....	290.22	.....	290.22	.....
Kasch Fellowships.....	180.00	.....	.....	.....	.....	180.05
Llora Culver Krueger Fund.....	.....	.....	2,155.36*	.....	.....	2,155.30
Lecture Fund.....	787.20	.....	.....	.....	621.75	165.46
National Rsch. Corp. Real Est. Tax	.....	1,017.00	.....	.....	.....	1,017.00
National Rsch. Council Spec. 2250	.....	.....	1,250.00	.....	1,250.00	.....
National Rsch. Corp. Fellowship...	.....	.....	1,012.50*	.....	1,012.50	.....
Patent Committee.....	77.51	.....	.....	.....	.....	77.51
Photographic Service.....	1,406.30	*6,332.38*	6,000.00	.....	.....	1,073.92
President's Fund.....	132.20	1,090.60	1,000.00	1,080.00	1,126.76	16.04
President's Portrait Fund.....	230.40	.....	.....	.....	.....	230.40
President's Special Fund "L".....	1,719.11	.....	.....	.....	487.68	1,231.43
Radiation Album Special No. 2124.	.....	.....	8,385.98	.....	.....	8,385.98
R. C. A. Award — Swanson.....	.....	1,000.00	.....	.....	1,000.00	.....
Emma Rogers Room Social Account	.....	292.65	31.77	31.77	292.65	.....
Sailing Trophy Fund.....	3.52	.....	.....	3.52	.....	.....
Special Appro. No. 2139.....	80.50	.....	.....	80.50	.....	.....
Tech War Record Spec. 2116....	.....	.....	7,300.89	.....	.....	7,300.89
Tennis Courts Spec. 2266.....	.....	.....	20,000.00	.....	7,977.70	12,022.30
Travel Special No. 2283.....	.....	.....	2,500.00	.....	.....	2,500.00
Undergraduate Schp. Award Special	.....	1,000.00	.....	.....	.....	1,000.00
Visiting Comm. Reports, Special...	.....	.....	500.00	147.24	.....	352.76
Henry E. Weihmiller Fund.....	.....	.....	702.40*	.....	.....	702.40
Granger Whitney Fund.....,....	.....	200.00	13.50*	.....	200.00	13.50
Walker New Student Lounge.....	.....	.....	35,000.00	.....	4,006.68	30,993.32
Women's Lounge Special No. 2274.	.....	.....	5,800.00	.....	2.33	5,797.67
Veterans' Administration.....	1,391.25	.....	.....	1,391.25	.....	.....
Veterans' Adm. Refund Account...	.....	3,886.17	.....	3,886.17	.....	.....
Veterans' Special.....	.....	19,293.07	.....	19,293.07	.....	.....
	$7,639.03	$36,370.76	$144,456.56	$26,083.32	$62,831.22	$99,551.81
Reserves:						
Bemis Real Estate Reserve.....	$2,500.96	.....	$400.52	.....	.....	$2,901.48
Bldg. 8 New Electric Lines Spec. 2022	1,132.45	.....	.....	$1,132.45	.....	.....
Div. of Ind. Coöp. Reserve.....	56,372.02	.....	42,673.02	56,372.02	.....	42,673.02
Graduate House Equip. Reserve...	1,193.00	.....	.....	.....	$1,193.00	.....
O.S.R.D. Receivable Reserve.....	.....	.....	2,000.00	.....	.....	2,000.00
Radar School, Harbor Bldg. Reserve	6,024.55	$8,623.46	.....	.....	.....	14,648.01
Special War Reserve Fund 1941–42	324,993.61	.....	.....	324,993.61	.....	.....
	$392,216.59	$8,623.46	$45,073.54	$382,498.08	$1,193.00	$62,222.51
Total.....	$1,897,501.89	$647,290.86	$1,007,181.79	$601,494.26	$1,774,868.32	$1,175,611.96

* Transferred from Major Funds.

(Schedule A)

SCHEDULE A-19

EDUCATIONAL PLANT ASSETS[1]

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	375,735.48	
Sloan Automotive Laboratories	357,610.96	
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 Laboratories	30,559.53	
Chemical Engineering Laboratory (Bldg. 38)	31,000.00	
Building 24	318,049.27	
		10,068,048.22
Educational Equipment		2,039,953.60
Undergraduate Dormitories		1,529,313.14
Infirmary, Recreational and Athletic Buildings:		
Homberg 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	
		1,569,355.30
Summer Camp:		
East Machias, Maine	$120,558.00	
		120,558.00
Miscellaneous:		
Power Plant	$389,064.17	
Steam and Electrical Distribution System	154,055.24	
Service Building and Garages	55,369.74	
Other Plant Assets	466,916.61	
		1,065,405.76
Total, June 30, 1947 (Schedule A)		$18,368,415.51

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, page 198.)

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	$5,859,828.69*	
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 Laboratory	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 Laboratory	224,131.35	
Appropriation for Automotive Laboratory — From Current Income	60,000.00	
Edmund D. Barbour Fund for:		
Nuclear Laboratory	32,341.27	
Magnetic Laboratory	40,772.73	
Power Plant	90,006.59	
Miscellaneous Contributions and Appropriations 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; Hydraulic Lab., $19,559.53; Gas Turbine Lab., $375,735.48; Bldg. 24, $318,049.27	794,345.87	

* Includes Mr. Eastman's original gift of $3,500,000 together with appropriations from the Building Fund of $2,500,000 which he established.

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	37,400.00	
		$9,696,378.59
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.	500,000.00	
Alumni Fund	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 Dormitories:		
Maria A. Evans Fund	$261,192.55	
T. C. duPont	100,000.00	
Alumni Dormitory Fund	566,945.66	
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, $70,389.35	200,205.61	
Appropriated, Current Income	22,369.92	
		1,529,313.14
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.

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	
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	
		$1,533,295.32
Miscellaneous:		
From Sale of Land and Buildings in Boston 1916	$656,919.45	
Other Contributions, Appropriations, etc.	1,345,807.42	
		2,002,726.87
Total June 30, 1947 (Schedule A)		$18,368,415.51

SCHEDULE B-1

STUDENTS' FEES

TUITION		
From Students (Cash)	$1,227,041.23	
Veterans Administration (Cash)	2,023,880.44	
Navy V-5 Program (Cash)	3,900.00	
Scholarship Awards	150,077.00	
Student Loan Awards	18,018.00	
		$3,422,916.67
Locker, Examination and Other Fees		7,907.62
Total (Schedule B)		$3,430,824.29

SCHEDULE B-2
DISTRIBUTION OF INCOME FROM INVESTMENTS

Endowment Funds:		*Total Investment Income*	*DEDUCTIONS* — *Credited to Other Income Accounts* — *Tuition*	*Gifts and Other Receipts*	*Added to Fund Balances* — *Unexpended Income of Endowment Funds*	*Principal of Other Invested Funds*	*Transferred to Current Funds*	*Income Not Distributed*	*Total*	*Balance of Investment Income*
General Purposes	A-3	$988,466.25	.....	.....	.....	$726.56	.....	.....	$726.56	$987.739.69
Designated Purposes	A-4	341,794.66	$107,834.16	.....	$88,238.96	9,343.12	$36,711.37	.....	242,127.61	99,667.05
Student Loan Funds	A-5	45,550.67	.....	.....	.....	45,550.67	.....	.....	45,550.67	.....
Building Funds	A-6	76,230.00	.....	.....	.....	76,230.00	.....	.....	76,230.00	.....
Other Invested Funds	A-7-8	151,608.75	.....	$151,608.75	.....	.....	.....	.....	151,608.75	.....
Deposits and Advances held for Investment	A-9	16,608.75	.....	.....	.....	16,608.75	.....	.....	16,608.75	.....
Conditional Gifts	A-10	11,964.36	.....	.....	.....	11,964.36	.....	.....	11,964.36	.....
Total Income Distributed to Funds		$1,632,223.44	$107,834.16	$151,608.75	$88,238.96	$160,423.46	$36,711.37	.....	$544,816.70	$1,087,406.74
Balance of Income not Distributed to Funds		13,518.78	.....	.....	.....	.....	.....	$13,518.78	13,518.78	.....
Total Investment Income		$1,645,742.22	$107,834.16	$151,608.75	$88,238.96	$160,423.46	$36,711.37	$13,518.78	$558,335.48	$1,087,406.74
		(Schedule B)							(Schedule B)	(Schedule B)

SCHEDULE B-3
SUMMARY OF GIFTS AND OTHER RECEIPTS FOR CURRENT USE AND EXPENDITURES THEREFROM

Unexpended Balances of Endowment Fund Income	*Gifts*	*Other Receipts*	*Total Gifts and Other Receipts*	*Investment Income*	*Total Received*	*Reserved for Future Use or Prior Year's Gifts used for Expenses (Net)*	*Total Used for Expenses*	*Other Expenditures not Included in Expenses**	*Total Expended from Funds per Funds Schedules*
	$15,758.36	$1,186.48	$16,944.84	.....	$16,944.84	*$16,944.84*	.....	.....	.....
Other Invested Funds Principal and Income Available:									
General Purposes	125,121.49	.....	125,121.49	$25,691.25	150,812.74	*123,313.74*	$27,499.00	$449,723.38	$477,222.38
Departments and Research	139,523.61	222,456.17	361,979.78	87,093.75	449,073.53	*301,092.56*	147,980.97	3,330.83	151,311.80
Library	3,058.66	.....	3,058.66	4,102.50	7,161.16	*6,209.90*	951.26	.....	951.26
Miscellaneous Funds and Deposits	198.036.33	55,489.25	253,525.58	32,032.50	285,558.08	*257,650.59*	27,907.49	53,670.61	81,578.10
Reserves	.....	261,800.00	261,800.00	2,688.75	264,488.75	134,426.35	398,915.10	28,779.80	427,694.90
	$465,740.09	$539,745.42	$1,005,485.51	$151,608.75	$1,157,094.26	*$553,840.44*	$603,253.82	$535,504.62	$1,138,758.44
Funds for Current Use — not Invested	437,384.47	209,906.39	647,290.86	.....	647,290.86	719,295.84	1,366,586.70	408,281.62	1,774,868.32
	$918,882.92	$750,838.29	$1,669,721.21	$151,608.75	$1,821,329.96	$148,510.56	$1,969,840.52	$943,786.24*	$2,913,626.76
						(Schedule B)	(Schedule B)	(Schedule B)	

* Including $827,307.58 expended for educational plant.

SCHEDULE B-4

GIFTS AND OTHER RECEIPTS FOR CURRENT EXPENSES

Department	*Salaries*		*Other Expenses*	*Total*
Aeronautical Engineering				$121,667.27
Staff:				
Wind Tunnel	$36,874.64	Current Funds	$58,252.95	
Pilot Training	6,000.00			
Accessory to Teaching:				
Wind Tunnel	15,070.73			
Laboratory Service:				
Five-Foot Tunnel	791.32			
Instrument Laboratory	2,587.50			
Wind Tunnel	2,090.13			
	$63,414.32			
Architecture				2,394.91
Accessory to Teaching Salaries:		Boles Fund	$796.22	
Special 1899	$363.00	Chamberlain Fund	275.00	
		Mauran Fund	77.98	
		Ware Fund	536.71	
		Current Funds	346.00	
			$2,031.91	
Bemis Research				14,380.71
Staff Salaries:				
Bemis Research Fund	$7,171.09	Bemis Research Fund	$6,945.62	
Accessory to Teaching:				
Bemis Research Fund	264.00			
	$7,435.09			
Biology				133,557.97
Staff Salaries:				
American Cancer	$3,705.00	Sedgwick Fund	$2,989.82	
Armour & Co	4,450.46	Current Funds	69,282.27	
Baruch Fund	2,700.00			
Corn Industries	3,478.75		$72,272.09	
Electron Micro	7,370.00			
A. C. Lawrence Fund	2,950.00			
Lilly Poison Ivy	700.00			
Rockefeller Research	16,336.80			
Accessory to Teaching Salaries:				
American Cancer	400.00			
Armour & Co.	994.75			
Baruch Fund	1,774.66			
Corn Industries	276.77			
Electron Micro	540.70			
Rockefeller Research	318.70			
Submarine Signal	782.12			
Laboratory Service Salaries:				
American Cancer	1,050.73			
Biology Shop	8.12			
Baruch Fund	2,654.96			
Electron Micro	1,610.44			
Rockefeller Research	8,893.12			
Rubber Research	289.80			
	$61,285.88			

SCHEDULE B-4 — (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Building Engineering and Construction				$49,995.88
Staff Salaries:				
Cabot Pigment Research	$416.68	Current Funds	$37,177.73	
National Lime Assn.	581.64			
Plastics Materials Mfers.	5,575.79			
Accessory to Teaching:				
Cabot Pigment Research	340.99			
National Lime Assn.	1,153.45			
Plastics Materials	1,817.10			
Laboratory Service:				
Plastics Materials	2,932.50			
	$12,818.15			
Business and Engineering Administration				17,677.61
Staff Salaries:				
Sloan Professorship in Industrial Mgmt.	$10,600.00	Current Funds	$7,077.61	
Chemistry				78,167.52
Staff Salaries:				
Abbott Laboratories	$958.30	Moore Fund	$72.30	
Anonymous	807.01	Current Funds	36,811.05	
Bristol Laboratories	100.00			
Cash	429.62		$36,883.35	
Cope Research	1,450.00			
Diamond Alkali	4,000.00			
Harshaw Chem.	894.35			
Arthur D. Little Fund	1,050.00			
Rockefeller Research	3,135.00			
Research Corp.	1,907.94			
Vitamin A and D	1,980.00			
Sharp & Dohme	3,000.00			
Sugar Research	12,839.16			
Swift Amino Acid	816.58			
Swift & Co.	2,202.50			
Accessory to Teaching:				
Diamond Alkali	446.26			
Physical Chem. Roy	1,448.45			
Vitamins A and D	906.50			
Sugar Research	167.10			
Welch Fund	100.00			
Laboratory Service:				
Harshaw Chemical Co.	224.00			
Sugar Research	2,421.40			
	$41,284.17			
Chemical Engineering				20,589.34
Staff Salaries:				
Cash	$60.00	Badger Fund	$336.00	
Research Corporation	999.96	Current Funds	16,108.04	
Standard Oil Devel.	2,908.82			
Accessory to Teaching:			$16,444.04	
Research Corporation	22.32			
Standard Oil Devel.	106.10			

SCHEDULE B-4 — (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Chemical Engineering — *(Continued)*				
Laboratory Service:				
Solar Energy	$48.10			
	$4,145.30			
Chemical Engineering Practice School				$10,000.00
		Chem. Eng. Practice Fd.	$10,000.00	
Civil Engineering				29,743.33
Staff Salaries:				
Teachers Fund	$2,600.00	Current Funds	$22,255.13	
Civil Welding Research	1,029.14			
Wallace & Tiernan	3,000.00			
Laboratory Service:				
Soil Mechanics	135.00			
Structural Laboratory	54.00			
Special 2155	670.06			
	$7,488.20			
Economics				15,209.98
Staff Salaries:				
U. S. Steel Fund	$2,475.00	Current Funds	$3,928.31	
Rockefeller Research	7,347.97			
Accessory to Teaching	1,458.70			
	$11,281.67			
Electrical Engineering				187,155.93
Staff Salaries:				
Radar School	$50,042.86	Servomechanisms Research	$3,500.00	
Center of Analysis	17,519.85	Current Funds	31,940.58	
High Voltage	7,176.61			
Hyams Radiation Res.	2,298.86		$35,440.58	
Network Analyzer	2,977.88			
Rockefeller Research	14,701.00			
Accessory to Teaching:				
Balsbaugh Research	528.00			
Center of Analysis	5,340.00			
High Voltage	1,736.54			
Hyams Radiation Res.	365.89			
Network Analyzer	609.60			
Rockefeller Research	162.78			
Miscellaneous	279.23			
Laboratory Service Salaries:				
Radar School	524.58			
Center of Analysis	27,519.55			
Balsbaugh Research	2,059.16			
Network Analyzer	31.45			
Special 2176	27.27			
Geol. Soc. of America	5.99			
Geology	5.20			
Solar Energy	17.48			
Photo Service	20.84			
Lowell Institute	394.05			
High Voltage	7,589.96			
Hyams Radiation Res.	1,743.35			

SCHEDULE B-4 — (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Electrical Engineering — (*Continued*)				
Rockefeller Research	$3,769.28			
Servomechanism	705.70			
Special 2134	204.30			
Miscellaneous	3,358.09			
	$151,715.35			
English and History				$7.47
		Current Funds	$7.47	
Food Technology				92,127.80
Staff Salaries:				
United Fruit	$7,918.39	Food Research	$768.85	
Vitamin K	1,155.00	Nutrition Research	768.84	
Food Research	31,636.68	Current Funds	36,811.24	
Lever Bros.	295.68			
Nutrition Research	962.50		$38,348.93	
Refrigeration Research	1,800.00			
Swift Nutrition	1,980.00			
Accessory to Teaching:				
Quaker Nutrition	250.00			
United Fruit	1,901.59			
Vitamin K	362.60			
Apple Fellowship	2,082.78			
Fat Research	1,454.59			
Food Research	1,532.06			
Lever Bros.	89.40			
Swift Nutrition	357.60			
	$53,778.87			
Geology				16,178.48
Staff Salaries:				
Geol. Soc. of America	$1,648.00	Current Funds	$12,491.77	
Accessory to Teaching:				
Geol. Soc. of America	353.13			
Geophysical Research	181.00			
Laboratory Service Salaries:				
Geol. Soc. of America	1,504.58			
	$3,686.71			
Graphics				4.20
		Current Funds	$4.20	
Group Dynamics				32,786.86
Staff Salaries:				
Group Dynamics	$18,228.29	Group Dynamics Fund	$8,794.48	
Accessory to Teaching:				
Group Dynamics	5,764.09			
	$23,992.38			
Industrial Relations				69,617.91
Staff Salaries:				
U. S. Steel Fund	$2,655.00	Ind. Relations Fund	$11,498.31	
Indus. Relations Fund	48,969.94			

SCHEDULE B-4 — (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Industrial Relations — (*Continued*)				
Accessory to Teaching:				
Indus. Relations Fund	$6,494.66			
	$58,119.60			
Mathematics				$9,193.27
Staff Salaries:				
Applied Mathematics	$2,608.37	Current Funds	$6,584.90	
Mechanical Engineering				104,867.79
Staff Salaries:				
A.S.M.E. Research	$2,640.00	Magnaflux Research	$1,000.00	
Gas Turbine Laboratory	17,865.71	M. E. Shop Account	1,500.00	
Machine Tool 2201	4,520.87	Current Funds	28,973.49	
Mech. of Metals 2041	3,300.00			
Slater Fund	16,578.20		$31,473.49	
Special 2160	1,678.91			
Accessory to Teaching:				
Cavitation Research	84.38			
deForest Research	1,746.00			
Gas Turbine Laboratory	2,791.98			
Mach. Tool Spec. 2201	1,011.59			
Mech. of Metals 2041	573.18			
Slater Fund	540.00			
Special 2176	353.41			
Special 2099	13.50			
Special 2160	1,800.38			
Miscellaneous	145.00			
Laboratory Service Salaries:				
Building Service. Sal.	343.66			
Cash	61.95			
Gas Turbine Laboratory	2,785.30			
Lab. Rev. Spec. 2095	6.38			
Mach. Tool Spec. 2201	1,749.16			
Shop Maintenance	3,258.41			
Special 2160	9,546.33			
	$73,394.30			
Metallurgy				48,722.76
Staff Salaries:				
Cash	$77.87	Current Funds	$31,782.59	
Armour Flotation	910.00			
Eng. Fdrs. Welding	1,200.00			
Republic Steel Fund	3,042.00			
Sheffield Foundation	2,400.00			
Special 1818	200.00			
Vanadium Corp.	2,160.00			
Wellman Fellowship	1,200.00			
Accessory to Teaching:				
Cash	127.02			
Corrosion Research	141.13			
Armour Flotation	7.60			
Mineral Dressing	5.80			
Republic Steel	130.09			
Vanadium Corp.	36.76			
Wellman Fellowship	41.85			

SCHEDULE B-4 — (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Metallurgy — (*Continued*)				
Laboratory Service Salaries:				
Eng. Fdrs. Welding	$1,098.95			
Sheffield Foundation	3,067.53			
Unexcelled Mfg.	687.70			
Wellman Fellowship	405.87			
	$16,940.17			
Meteorology				$10,417.59
Staff Salaries:				
Weather Bureau	$8,830.00	Current Funds	$1,557.59	
Laboratory Service Salaries:				
Weather Bureau	30.00			
	$8,860.00			
Naval Architecture				667.68
		Current Funds	$667.68	
Nuclear Science and Engineering				25,000.00
		Radioactivity Research	$25,000.00	
Physics				112,867.82
Staff Salaries:				
Cash	$1,183.32	Current Funds	$69,346.17	
Acoustics Laboratory	1,395.00			
Am. Petroleum	5,271.44			
Industrial Fund	2,800.00			
Nuclear Research	5,250.00			
Radioactivity Center	238.34			
Special 2047	4,880.00			
Accessory to Teaching:				
Am. Petroleum	292.25			
Radioactivity Center	3,130.67			
Rockefeller Research	312.52			
Special 2047	596.12			
Special 2146	633.39			
Laboratory Service Salaries:				
American Cancer Society	6.50			
Baruch Fund	3.50			
Radioactivity Center	8,611.79			
Acoustics Laboratory	2,798.72			
American Petroleum	1,964.04			
Harshaw-Stockbarger	579.60			
Rockefeller Research	2,703.43			
Miscellaneous	871.02			
	$43,521.65			
Solar Energy Research				35,564.62
Staff Salaries:				
Solar Energy Fund	$14,579.94	Current Funds	$20,208.55	
Accessory to Teaching:				
Solar Energy Fund	776.13			
	$15,356.07			
Department Staff Scholarships				22,400.00
		Upham Fund	$22,400.00	

SCHEDULE B-4— (Continued)

Department	*Salaries*		*Other Expenses*	*Total*
Library and Museum				$32,299.31
Vail Fund	$2,970.00	Barker Fund	$305.26	
Current Funds	11,614.27	Berke Fund	60.30	
		Flint Fund	197.49	
	$14,584.27	Kerr Fund	129.76	
		Osborne Fund	9.84	
		Rotch Fund	251.06	
		Tod Fund	42.82	
		Library Growth Fund	951.26	
		Current Funds	15,767.25	
			$17,715.04	
General Administrative Expenses				44,624.00
Alumni Fund	$2,860.00	Misc. Major Funds	$26,081.83	
		Cosmic Terrestrial Research	2,053.28	
		Current Funds	13,628.89	
			$41,764.00	
Plant Operation				644,794.93
		Use of Facilities	$636,817.23	
		Tennis Courts, Special	7,977.70	
			$644,794.93	
Medical Department				3,889.00
Kales Fund	$1,500.00	H. Fletcher Fund	$325.00	
		Hayden Fund	1,660.00	
		Kales Fund	341.48	
		Current Funds	62.52	
			$2,389.00	
Undergraduate Budget Board				1,900.00
		Morss Nautical	$1,900.00	
	$691,033.52		$1,297,438.42	$1,988,471.94
Less: Net amount of departmental revenue included above which was appropriated directly from investment income of Endowment Funds				18,631.42
Total (Schedule B)				$1,969,840.52

SCHEDULE B-5

RESEARCH CONTRACTS

Total Direct Contract Costs	$8,018,274.77	
Total Overhead Allowances	1,806,659.76	
Total Contract Revenues		$9,824,934.53
Less Appropriations:		
To: Reserve for Use of Facilities	$261,800.00	
Industrial Fund	129,700.00	
Investment Income	99,447.00	
		490,947.00
Total (Schedule B)		$9,333,987.53
Contract Costs		
Salaries and Wages	$4,009.638.92	
Material and Services	3,032,993.53	
Terminated Orders	735,679.06	
Travel, Communications, etc.	165,919.09	
Other	74,044.17	
		$8,018,274.77
Other Expenses		
Salaries and Wages	$123,398.97	
Materials and Services	16,842.80	
Space Rentals	36,667.79	
Depreciation	22,615.63	
Instrumentations Laboratory	19,026.58	
Servomechanisms Laboratory	16,081.29	
Guards' Wages	16,253.17	
Auditing and Professional Services	11,898.41	
Non-Reimbursable Items and Losses	28,863.86	
Other	19,451.24	
		311,099.74
Total (Schedule B)		$8,329,374.51

SCHEDULE B-6

RENTALS AND OTHER INCOME

Anonymous for Chemical Engineering	$1,000.00
Photographic Service, Rental	5,000.00
Land Rentals, etc.	4,600.00
Lecture Notes	1,328.68
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
Recoveries of Student Fees Prior Years (Net)	193.28
Ednah Dow Cheney Fund	606.99
Appropriation Recoveries Prior Years	13,390.67
Federal Aid	21,777.20
Trustees of H. C. Frick Estate	2,191.15
United States Navy Fire Control Research	1,150.00
U. S. Government — Veterans Administration	19,293.07
Total (Schedule B)	$86,931.04

SCHEDULE B-7

SALARIES AND WAGES OF STAFF, ACCESSORY TO TEACHING AND LABORATORY SERVICE

Department	*Staff Salaries*	*Wages Accessory to Teaching*	*Wages Laboratory Service*	*Total**
Aeronautical Engineering	$191,450.67	$18,842.68	$15,485.45	$225,778.80
	39,791.47	.....	.....	*39,791.47*
Architecture	100,271.61	7,539.39	1,227.60	109,038.60
Bemis Research	7,171.09	264.00	.....	7,435.09
Biology	6,931.01	8,971.81	22,999.69	138,902.51
	10*9,400.37*	.....	*74.99*	*9,475.36*
Building Eng. and Construction	35,496.64	5,027.54	2,932.50	43,456.68
Business and Eng. Adminis.	98,617.65	12,096.12	.....	110,713.77
Chemical Engineering	164,002.68	10,561.09	20,308.65	194,872.42
	45,523.63	.....	*898.32*	*46,421.95*
Chemical Eng. Practice School	27,342.50	.....	.....	27,342.50
Chemistry	320,575.39	19,079.50	37,467.12	377,122.01
	67,016.08	*2,030.60*	*6,630.42*	*75,677.10*
Civil Engineering	118,553.44	5,434.59	14,980.78	138,968.81
	5,215.41	.....	.....	*5,215.41*
Division of Laboratory Supplies	.....	.....	39,296.97	39,296.97
Economics	104,092.71	8,439.79	.....	112,532.50
	1,050.00	.....	.....	*1,050.00*
Electrical Engineering	632,604.23	32,221.23	90,297.83	755,123.29
	241,775.14	.....	*14,096.76*	*255,871.90*
English and History	121,114.07	6,451.94	.....	127,566.01
Food Technology	73,348.27	10,616.00	5.00	83,969.27
Gen. Eng. and General Science	3,800.00	1,584.00	.....	5,384.00
Geology	60,398.71	4,041.88	3,316.18	67,756.77
Graphics	53,417.76	1,955.48	.....	55,373.24
Group Dynamics	19,714.97	5,764.09	.....	25,479.06
	1,486.68	.....	.....	*1,486.68*
Industrial Relations Section	51,624.94	6,494.66	.....	58,119.60
Lantern Operation	.....	.....	596.09	596.09
Mathematics	147,787.47	3,900.00	.....	151,687.47
	5,051.12	.....	.....	*5,051.12*
Mechanical Engineering	430,138.17	23,453.61	62,578.98	516,170.76
	38,673.98	.....	*601.46*	*39,275.44*
Metallurgy	195,436.13	11,111.88	30,827.36	237,375.37
	59,406.67	*1,157.46*	*173.69*	*60,737.82*
Meteorology	86,094.48	8,103.38	3,491.50	97,689.36
	35,436.80	.....	.....	*35,436.80*
Military Science	11,132.61	1,639.87	.....	12,772.48
Modern Languages	35,813.34	1,736.61	.....	37,549.95
Naval Architecture	56,907.94	3,502.60	3,125.70	63,536.24
Physics	417,990.24	18,192.43	68,603.01	504,785.68
	201,845.78	.....	*1,891.74*	*203,737.52*
Solar Energy Research	14,579.94	776.13	.....	15,356.07
Totals	$2,934,735.53	$234,614.24	$393,173.03	$3,562,522.80

(Schedule B)

*Figures in italics transferred to D. I. C. Salary Account.

SCHEDULE B-8
DEPARTMENTAL EXPENSES

Aeronautical Engineering				$62,093.95
General	$3,075.31	Vibration Research	$500.00	
Staff Scholarships	3,341.00	Current Funds	55,177.64	
Architecture				7,988.92
General	2,763.95	Ware Fund	536.71	
Special 2238	949.09	Mauran Fund	77.98	
Special 2239	1,620.36	City Planning	498.11	
Special 2282	25.50	Staff Scholarships	100.00	
Boles Fund	796.22	Current Funds	346.00	
Chamberlain Fund	275.00			
Bemis Research				6,945.62
General	6,945.62			
Biology				81,430.59
General	4,875.83	Sedgwick Fund	2,989.82	
Staff Scholarships	250.00	Biol. Eng. Equip.	4,032.67	
		Current Funds	69,282.27	
Building Engineering and Construction				38,549.79
General	1,372.06	Current Funds	37,177.73	
Business and Engineering Administration				11,282.67
General	4,205.06	Current Funds	7,077.61	
Chemical Engineering				50,421.89
General	15,439.23	Practice School	14,826.62	
Staff Scholarships	3,712.00	Current Funds	16,108.04	
Badger Fund	336.00			
Chemistry				72,356.04
General	25,232.69	Staff Scholarships	10,240.00	
Current Funds	36,811.05	Moore Fund	72.30	
Civil Engineering				36,220.42
General	4,321.12	Structural Laboratory	1,006.05	
Staff Scholarships	1,741.00	Summer Camp	4,565.44	
Soil Mechanics Laboratory	239.68	San. Eng. Laboratory	2,092.00	
Current Funds	22,255.13			
Economics and Social Sciences				7,807.47
General	3,079.16	Staff Scholarships	800.00	
Current Funds	3,928.31			
Electrical Engineering				81,575.98
General, inc. Equipment	35,042.08	High Voltage Spec.	3,763.07	
Current Funds	31,940.58	Staff Scholarships	5,794.00	
Servo Res.	3,500.00	Teaching Assistants	536.25	
Via Travel	1,000.00			
Electronics Laboratory				66.70
General	66.70			
English and History				3,215.59
General	3,208.12	Current Funds	7.47	
Food Technology				38,348.93
General	1,537.69	Current Funds	36,811.24	
General Science and Engineering				69.30
General	69.30			
General Studies				134.55
General	134.55			
Geology				25,732.84
General	5,338.47	Equipment Special	7,902.60	
Current Funds	12,491.77			
Graphics				1,962.71
General	1,958.51	Current Funds	4.20	

SCHEDULE B-8 — (Continued)

Group Dynamics				$8,794.48
General	$8,494.48	Staff Scholarships	$300.00	
Humanics				238.90
General	238.90			
Industrial Relations Section				11,498.31
General	9,943.33	Library	1,554.98	
Mathematics				10,526.11
General	2,741.21	Staff Scholarships	600.00	
Current Funds	6,584.90	Journal Math. and Physics	600.00	
Mechanical Engineering				68,560.32
General	19,008.18	Staff Scholarships	3,737.00	
Special 2095	205.87	Fatigue Laboratory	285.78	
Machine Tool Laboratory	16,350.00	Current Funds	28,973.49	
Mechanical Metallurgy				4,033.69
General	4,033.69			
Metallurgy				54,813.99
General	9,665.17	Special 2202	7,500.00	
Staff Scholarships	1,504.00	Current Funds	31,782.59	
Chipman Research	1,124.52	Mineral Dressing Res.	1,040.16	
Special 1818	2,197.55			
Meteorology				7,753.10
General	5,318.51	Staff Scholarships	877.00	
Current Funds	1,557.59			
Military Science				2,048.46
General	2,048.46			
Modern Languages				1,399.93
General	1,399.93			
Naval Architecture				2,462.65
General	1,694.97	Staff Scholarships	100.00	
		Current Funds	667.68	
Nuclear Science and Engineering				89,389.06
General	89,389.06			
Physics				131,546.35
General	12,451.60	Staff Scholarships	6,653.00	
Equipment Special	23,250.68	Research	19,844.90	
		Current Funds	69,346.17	
Solar Energy Res.				20,208.55
General	20,208.55			
Spectroscopy Laboratory				426.46
General	426.46			
Total (Schedule B)				$939,904.32

SCHEDULE B-9
LIBRARY AND MUSEUM EXPENSES

Library		$166,189.71
Salaries of Officers	$38,034.00	
Wages, Office and Clerical	61,304.28	
Expenses — General	59,397.34	
Expenses — Office of Director	1,342.25	
Special Appropriation No. 2240	3,000.00	
Biology Library, Special	3,111.84	
Museum		18,937.62
Museum Committee	$13,937.62	
Dard Hunter Museum	5,000.00	
Total (Schedule B)		$185,127.33

SCHEDULE B-10
CLERICAL AND OFFICE EXPENSE — ADMINISTRATION

	Salaries	*Expense*	*Total*
President	$12,283.81	$8,219.73	$20,503.54
Dean of Engineering	2,184.00	695.37	2,879.37
Dean of Science (Net)	1,111.86	588.05	1,699.91
Dean of Humanities	1,960.00	664.30	2,624.30
Dean of Students	9,405.91	2,412.39	11,818.30
Dean of Graduate School	2,121.10	946.66	3,067.76
Registrar	59,072.64	25,357.21	84,429.85
Director of Admissions	39,575.97	17,196.61	56,772.58
Treasurer and Bursar	78,078.40	13,721.04	91,799.44
Superintendent	17,040.70	2,480.72	19,521.42
News Service	4,038.19	3,596.68	7,634.87
Undergraduate Scholarship and Loan Fund Board	13,192.16	4,397.62	17,589.78*
New Student Publicity	.....	2,323.95	2,323.95
Placement Bureau	19,337.52	3,038.49	22,376.01
Register of Former Students	.....	8,228.27	8,228.27
Personnel Office	7,056.33	1,765.67	8,822.00
Total	$266,458.59	$95,632.76	$362,091.35

(Schedule B)

*Expenses for two years, 1945–46 and 1946–47.

SCHEDULE B-11

GENERAL ADMINISTRATIVE EXPENSE

Bulletins				$23,547.02
President's Report	$6,628.00	General Catalogue	$13,823.02	
Directory	3,096.00			
Other Publicity				2,810.00
Honoraria	750.00	Tech Review to Tech Clubs	560.00	
Tech Review to Schools	1,500.00			
General Expense				365,798.89
Allowances	7,499.98	Employees' Pensions and Insurance	67,938.23	
Pensions	27,492.64	Commencement, etc.	12,858.73	
Insurance, etc.	*292.75*[1]	Travel	17,831.64	
Taxes, Cambridge	4,251.10	Telephone Service	66,234.32	
Auditing	8,000.00	Dues, Fees, etc.	7,404.76	
Staff Pensions	140,592.68	Services (net)	5,987.56	
Special Expense				149,069.50
Special, Anderson & Beckwith	2,523.43	President's Funds	3,361.95	
Visiting Comm. Reports	500.00	Group Air Insurance	1,405.67	
New Equipment	23,549.51	Surplus Prop. Comm.	44,132.17	
Lowell Institute Special	5,000.00	Navy Vault Special	882.99	
Historic Mem. Comm.	290.22	Radiation Album Sp.	6,614.02	
War Record	1,232.40	Educational Survey Special	1,118.74	
Society of Arts	1,851.97	Course Exhibit Special	1,117.43	
Bulletin Board Special	2,475.00	Misc. Major Funds	26,081.83	
Fund Raising Special	10,000.00	Misc. Current Funds	15,682.17	
		Special Awards	1,250.00	
Total (Schedule B)				$541,225.41

[1] Includes Workmen's Compensation, General Liability and all coverages except Fire Insurance (see Schedule B-12 · Also Radiation Laboratory Workmen's Compensation refund of $18,377 was received this fiscal year.

SCHEDULE B-12

DEPARTMENT OF BUILDINGS AND POWER

Building Service				$292,965.38
Janitors	$108,070.67	Heat'g and Vent'g	$27,169.38	
Night Cleaners	75,618.01	Shop Foreman (net)	4,849.59	
Watchmen	34,903.43	Mail and Elevators	12,813.42	
Window Clean.	11,415.54	Shipper, Stock Room, Matron, Messenger	18,125.34	
Power Plant and Electric Power				248,776.31
Fuel Oil			$104,754.17	
Coal			44,483.59	
Cambridge Electric Light Co., Power			116,447.56	
Salaries			38,897.16	
Repairs			11,869.51	
Water, Supplies, etc.			8,899.84	
Total Operating Cost			$325,351.83	
Less: Credits — Electric Power		$26,141.51		
Steam		50,434.01	76,575.52[1]	
Repairs, Alterations and Maintenance				272,497.33
Buildings	$89,147.15	Water and Gas	$20,118.76	
President's House	15,385.66	Furniture	5,067.60	
Grounds, Roads, etc.	38,843.97	Elevators	4,432.04	
Mains and Conduits	18,972.33	Tennis Courts	7,977.70	
Main Court Alterations	1,861.00	Miscellaneous (net)	45,396.74	
Electrical Distribution Special 2209			21,287.70	
Student Lounge, Walker Memorial			4,006.68	
Fire Insurance				13,810.48
Total				$828,049.50
Special Alterations				636,817.23
Chemistry Laboratories			$258,278.87	
Special Painting			41,509.54	
Other			337,028.82	
Total (Schedule B)				$1,464,866.73

[1] Including Dormitories, Graduate House, Walker Memorial and Bexley Hall.

SCHEDULE B-13

MEDICAL DEPARTMENT

Salaries, Staff				$42,807.91
Expense of Clinic				35,014.95
Salaries	$18,681.37	X-Ray Operation	$6,237.89	
Supplies, etc.	2,262.60	Physical Examinations	7,833.09	
Expense of Infirmary				48,231.62
Salaries	29,919.67	Food (net)	7,171.03	
Equipment and Supplies	7,654.03	Laundry	3,486.89	
Expense of Dental, Eye, Nose and Throat Clinics				7,866.58
Dental	2,520.96	Nose and Throat	349.69	
Eye	4,995.93			
Maintenance and Repairs				4,235.47
Total (Schedule B)				$138,156.53

SCHEDULE B-14

UNDERGRADUATE BUDGET BOARD

Athletic Coaches' Salaries	$32,536.66	
Undergraduate Dues	36,477.00	
Walker Memorial (excluding Dining Service) (net)	28,822.20	
Athletic Fields, Maintenance	35,784.36	
Sailing Pavilion and Activities (net)	11,982.74	
Boat House and Launches, Maintenance	13,137.49	
Musical Clubs	1,000.00	
Swimming Pool (Excluding Wages)	8,935.02	
Publicity and Administration Expense	910.77	
Total (Schedule B)		$169,586.24

SCHEDULE B-15

AUXILIARY ACTIVITIES

SUMMARY

		Income	*Expense*
B-15 A.	Graduate House	$172,561.23	$172,561.23
B-15 B.	Undergraduate Dormitories	227,133.99	204,627.17
B-15 C.	Walker Memorial Dining Service	448,845.47	448,845.47
B-15 D.	Graduate House Dining Service	261,786.87	261,786.87
B-15 E.	Barracks Dormitory	60,172.41	60,172.41
B-15 F.	Women's Dormitory	11,830.50	11,830.50
B-15 G.	Westgate Project	58,080.62	58,080.62
B-15 H.	Westgate West Project	37,778.04	37,778.04
Total (Schedule B)		$1,278,189.13	$1,255,682.31

SCHEDULE B-15 A

GRADUATE HOUSE OPERATION

Income:		
Rentals (Net)		$167,344.00
Miscellaneous		5,217.23
Total (Schedule B-15)		$172,561.23
Expense:		
Salaries	$82,002.73	
Real Estate Tax	6,189.82	
Light, Heat, Power and Water	19,378.67	
Repairs	13,499.20	
Supplies (Net)	3,796.99	
Laundry	6,242.06	
Administration	2,905.34	
Equipment	1,997.50	
Dining Service Deficit	25,890.59	
Depreciation	7,482.15	
House Tax Allowance	900.00	
Insurance	2,276.18	
Total		$172,561.23
Balance — Income (Schedule A-1)		00.00
Total (Schedule B-15)		$172,561.23

SCHEDULE B-15 B

UNDERGRADUATE DORMITORY OPERATION

Income:		
Rentals (Net)		$223,723.00
Miscellaneous		3,410.99
Total (Schedule B-15)		$227,133.99
Expense:		
Salaries	$100,702.92	
Light, Heat, Power, Water	26,091.29	
Repairs	18,703.09	
Supplies (Net)	5,069.83	
Equipment	5,196.05	
Laundry	4,858.56	
Administration	5,422.08	
Senior House Alterations	35,013.35	
House Tax Allowance	3,570.00	
Total (Schedule B-15)		$204,627.17
Balance		22,506.82
Total		$227,133.99

SCHEDULE B-15 C

WALKER MEMORIAL DINING SERVICE

Income:		
Cash	$428,468.73	
From Reserve Fund to Offset Deficit	20,376.74	
Total (Schedule B-15)		$448,845.47
Expense:		
Food	$290,958.64	
Salaries	106,799.90	
Light, Heat, Power, Water	8,850.99	
Laundry	3,397.15	
Equipment	16,735.96	
Repairs	5,123.15	
Administration	5,476.14	
Occupancy	12,000.00	
Total Expense	$449,341.93	
Deduct Increase in Inventory at June 30, 1947	496.46	
Total (Schedule B-15)		$448,845.47

SCHEDULE B-15 D

GRADUATE HOUSE DINING SERVICE

Income:		
Cash	$261,786.87	
Total (Schedule B-15)		$261,786.87
Expense:		
Food	$185,374.42	
Salaries	83,573.24	
Light, Heat, Power, Water	4,082.67	
Laundry	696.60	
Equipment and Supplies	3,802.13	
Repairs	4,087.25	
Administration	2,786.56	
Total Expense	$284,402.87	
Add: Decrease in Inventory at June 30, 1947	3,274.59	
	$287,677.46	
Deficit — Charged To:		
Graduate House Operations	25,890.59	
Total (Schedule B-15)		$261,786.87

SCHEDULE B-15 E

BARRACKS DORMITORY OPERATION

Income:		
Rentals (Net)	$58,430.00	
Miscellaneous	1,742.41	
Total (Schedule B-15)		$60,172.41
Expense:		
Salaries	$35,403.25	
Light, Heat, Water	10,000.00	
Repairs	2,713.14	
Supplies (Net)	4,660.24	
Laundry	2,202.29	
Equipment	1,465.77	
Administration	1,432.16	
Depreciation	1,325.56	
House Tax Allowance	970.00	
Total (Schedule B-15)		$60,172.41

SCHEDULE B-15 F

WOMEN'S DORMITORY OPERATION

Income:		
Rentals	$11,830.50	
Total (Schedule B-15)		$11,830.50
Expense:		
Salaries	$3,591.33	
Food	4,385.34	
Real Estate Taxes	525.00	
Light, Heat, Power, Water	970.50	
Repairs	963.30	
Supplies	224.73	
Equipment	51.53	
Laundry	222.27	
Telephone and Insurance	176.13	
Depreciation	322.37	
House Tax Allowance	75.00	
Total		$11,507.50
Balance — Income (Schedule A-1)		323.00
Total (Schedule B-15)		$11,830.50

SCHEDULE B-15 G

WESTGATE — VETERANS' HOUSING PROJECT OPERATION

Income:		
Rentals	$58,080.62	
Total (Schedule B-15)		$58,080.62
Expense:		
Real Estate Tax	$10,740.00	
Agency Commission	3,018.05	
Electricity	1,929.92	
Water	608.10	
Insurance	760.76	
Repairs	4,224.90	
Administration	121.03	
Depreciation	24,177.86	
Total		$45,580.62
Balance — Income (Schedule A-1)		12,500.00
Total (Schedule B-15)		$58,080.62

SCHEDULE B-15 H

WESTGATE WEST
VETERANS' HOUSING PROJECT OPERATION
UNDER FEDERAL PUBLIC HOUSING AUTHORITY

Income:			
Rentals		$37,778.04	
Total (Schedule B-15)			$37,778.04
Expense:			
Real Estate Tax	$6,086.00		
Repairs	5,447.64		
Electricity	3,057.46		
Water	615.10		
Agency Commission	1,929.80		
Administration	171.17		
Liability Insurance	42.50		
F.P.H.A. Land Rent	1,487.50		
F.P.H.A. Reserve Allowance	6,425.38		
F.P.H.A. Management Allowance	767.85		
Total		$26,030.40	
Balance to United States Government		11,747.64	
Total (Schedule B-15)			$37,778.04

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. 204–225, Schedules A-3 to A-11.

801 ALBERT FUND, 1930–47. Balance $3,458. 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), 1935–1947 Balance $5,234.77. 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.

627 ANONYMOUS FUND (M), 1941, $1,500. For general purposes of the Institute.

981 ANONYMOUS FUND (Q), 1945–47. Balance $5,159.50. 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, $521,067.

983 ANONYMOUS FUND (X), 1944–45. Balance $19,670.12. Subject to special annuity provisions.

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 $2,908.02.

351 LOUIE G. APPLEBEE FUND, 1941–42, $400. Bequest for assisting deserving students.

703 APPLIED MATHEMATICS FUND, 1943. Balance $28,613. 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.

51 ARMY AND NAVY TRAINING RESERVE FUND, 1943–1944. Balance $28,779.80, used for new construction, 1947.

928 ASSOCIATION OF CLASS SECRETARIES FUND, 1940–45. Balance $2,884.33. Held for investment purposes only.

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.

985 AVOCA FUND, 1946, $76,200. In trust, subject to life annuities.

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.

631 E. B. BADGER AND SONS CO. FUND, 1944, $10,000. Gift. Used for new construction 1947.

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 $35,890.

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—$323,000 appropriated for educational plant, including swimming pool and current purposes. Present balance $52,371.

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 $308,768.

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 $12,059.57.

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 $36,354.

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, 1931–43, $961,249.84. 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, 1945–47, $19,261.16. 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, 1931–47. Balance $571,414. 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 to be used to defray living expense or tuition fees of any student. Present balance $35,605.17.

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.

637 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 $31,842.

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.

639 MARY A. CARLETON FUND, 1946, $14,456.48. Bequest for general purposes of the Institute. Appropriated for buildings, 1947.

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 $2,265.

713 CENTER OF ANALYSIS FUND, 1945. Balance $26,334. Transferred from current operating fund as a reserve — for investment purposes only.

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.

715 CHEMICAL ENGINEERING — BADGER FUND, 1945, $20,000. Gift for use of Department.

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 $269,928.

575 EDNAH DOW CHENEY FUND, 1905–06, $13,922. 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, $82,482.

377 LUCIUS CLAPP FUND, 1905, $4,900. Bequest. Income to worthy students who may not be able to complete their studies without help.

795 CLASS OF 1874 FUND, 1934, $287.55. For purposes of the Library.

881 CLASS OF 1887 FUND, 1941–46. Balance, $4,174.86. Held for use of Class and for final distribution as provided in Declaration of Trust.

883 CLASS OF 1889 FUND, 1947. Balance $165.63. 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 $13,049. By subscription of certain members of class from 1927–31. Income only for scholarship loans, as authorized by committee of Class.

555 CLASS OF 1904 FUND, 1925, $447. Contributions received by Professor Gardner for Architectural Department prizes.

383 CLASS OF 1909 SCHOLARSHIP FUND, 1934–46. Balance $3,918. Accumulated through contributions and from proceeds of life insurance policies. Principal to be invested, income available for scholarship aid with preference to direct descendants of members of Class of 1909.

885 CLASS OF 1914 FUND. Balance $976.62. Held for investment purposes only.

887 CLASS OF 1918 (ORGAN) FUND. Balance $1,933.88. Subscriptions by Class members toward purchase of an organ for Walker Memorial.

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.

801 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, 1946–7, Balance $4,516.75. Contributed for Class Twenty-Fifth Year Memorial Fund.

385 CLASS OF 1922 SCHOLARSHIP FUND, 1942–47. Balance $20,211. For scholarships.

387 CLASS OF 1922 SPECIAL SCHOLARSHIP FUND, 1944–46. Balance $4,800. For special scholarships.

389 CLASS OF 1938 SCHOLARSHIP FUND, 1938–46. Balance $900.29. Gift of Class of 1938. Income for scholarships.

895–927 inc.
CLASS ENDOWMENT FUNDS (See pages 222 to 225).
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 Renuions. 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.

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.

SAMUEL P. COLT FUND, 1920–22, $20,000. Bequest. Used for new dormitories, 1924.

399 WILLIAM A. CONANT FUND, 1943–44, $138,082. 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, 1941–46. Balance $32,810. Gifts in anticipation of and for ultimate addition to residue of a trust 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 COÖPERATIVE 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, 1938–47, $86,100. Gifts (anonymous) for special research. Present balance $22,496.

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.

645 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 $11,532.

587 CARL P. DENNETT FUND, 1926, $500. Gift. To be loaned to students, preferably Freshmen, at discretion of President. Present balance $1,928.

805 DAVIS R. DEWEY MEMORIAL FUND, 1943, $500. To provide a suitable memorial for the late Professor Dewey.

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.

807 DRAMA CLUB THEATRE FUND, 1938, $400. Deposited by Drama Club of M.I.T. toward future purchase of theatrical equipment.

111 EBEN S. DRAPER FUND, 1915, $100,000. Bequest. Specially invested. Income used for general purposes of the Institute. Present balance $105,260.

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.

647 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 $74,281.

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 endowments 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, 1946–47, $35,000. Contributions for Fellowships.

721 ELECTRONICS, RESEARCH LABORATORY OF, 1943. Balance $56,952. Appropriations from surplus for postwar research.

57 ARTHUR ELSON FUND, 1944, $500. For the purpose of special book purchases for the Library.

97 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 175, 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, 1945–46, $210,000. Contribution for research. Present balance $145,998.

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.

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.

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, 1915–16, $25,212.48. Bequest of Caroline L. W. French. For purposes of the Institute.

133 HENRY CLAY FRICK FUND, 1925–38, $1,831,053. 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 $88,000 appropriated for miscellaneous purposes.

285 GEORGE A. GARDNER FUND, 1898, $20,000. Gift. Income for salaries of instructors.

607 GAS TURBINE LABORATORY FUND, 1946, $500,000. Contributions from five industrial corporations for construction and operation of new laboratory.

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.

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, 1930–46, Balance $12,217.40. 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. Balance $36,668. Gift. For conduct of research in this field.

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, 1940–46. Balance $75,396. 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.

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.

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.

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, 1943–47. Present balance $19,565. 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 $213,336.

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.

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.

653 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, $1,000. Gift for special purposes.

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.

655 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. Balance $37,485. Gifts toward construction of new building.

737 INDUSTRIAL FUND, 1924–46. 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 Coöperation and Research. Used for purchase of new equipment and support of special research. (Page 175 this report.)

733 INDUSTRIAL ECONOMICS FUND, 1940–47. Balance $24,370. Contributions in support of Graduate Program in Economics.

739 INDUSTRIAL RELATIONS SECTION FUND, 1938–47. Balance $191,764. Contributions in support of the Industrial Relations Section of the Department of Economics.

741 INSTRUMENTATION FUND, 1943–45. Balance $346,988. For research in the field of instrument design.

657 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.

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.

659 CARRIE BELLE KENNEY FUND, 1945, $1,000. Bequest. Used for new construction, 1947.

743 A. NORTON KENT FUND, 1944–47, $500. Gift. For research in Physics. Appropriated, 1947.

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.

DAVID P. KIMBALL FUND, 1924, $10,000. Bequest. Used for educational plant, 1926.

455 AMELIA S. KNEISNER SCHOLARSHIP FUND, 1945–47, $14,000. Gift of the family. Income only to provide scholarship aid to meritorious or needy students — preference to students from Danbury (Connecticut).

811 KURRELMEYER FUND, 1945–46, $2,033. Contributions toward Memorial Fund.

591 LAMSON-VIRGIN LOAN FUND, 1946–47, $8,000. Bequest. Income to be used in aiding worthy students, with provision for repayment.

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.

799 LIBRARY GROWTH FUND, 1943–47. Balance $6,908. For investment purposes.

577 JACOB AND JENNIE LICHTER FUND 1944, $5475. Gift. To accumulate income and ultimately added to bequest.

457 WILLIAM LITCHFIELD FUND, 1910, $5,000. Bequest. Income for scholarship on competitive examination.

223 ARTHUR DEHON LITTLE MEMORIAL FUND, 1937. Balance $157,460. 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 $114,444.42 at June 30, 1947.

813 ARTHUR D. LITTLE MEMORIAL LECTURESHIP FUND, 1944, $6,100. Gift of Arthur D. Little, Inc., for purpose indicated.

661 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.

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.

463 RUPERT A. MARDEN FUND, 1933, $2,000. Gift (anonymous). Income to aid worthy student — Protestant and of American origin — preference to student taking Coöperative Course in Electrical Engineering (Course VI-A).

289 WILLIAM P. MASON FUND, 1868, $18,800. Bequest. Income to support a professorship in the Institute.

467 MARGARET A. MATHEWS FUND, 1947, $111,682. Bequest. For scholarship. For women students who expect to become teachers.

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.

931 M. I. T. ALUMNI, SPECIAL GIFTS FUND, 1944–47, Balance $3,220. Gifts to provide annual contribution to Alumni Fund from earned income.

815 M. I. T. ALUMNI FUND, 1940–47. 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 $530,228. In 1947, $500,000 was applied to the new Senior Dormitory construction, and $10,000 toward new Tennis Courts.

819 M. I. T. ALUMNI FUND, 1947–48. Net subscriptions to date of the eighth year of operation. Balance $98,823.04.

929 M. I. T. ALUMNI ASSOCIATION PERMANENT FUND, 1929–46. Balance $105,705.12. Deposited with M. I. T. for investment purposes only.

465 M. I. T. CLUB OF CHICAGO FUND, 1944–47, $6,000. Gift. For scholarships.

821 M. I. T. TEACHERS' INSURANCE FUND, 1928–47. Refund of premiums paid on Group Insurance under M. I. T. Pension and Insurance Plan held at interest and accumulated. Appropriated for special pension purposes only. Balance $130,792.

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 $3,445.

227 GEORGE HENRY MAY FUND, 1914, $4,250. Gift, Income for benefit of Chemical 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.

663 CHARLES E. MERRILL FUND, 1943, $2,300. Used for new construction, 1947.

615 METALS PROCESSING LABORATORY FUND, 1947, $10,000. 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.

685 MISCELLANEOUS FUND, 1947. Present balance $9,400. Contributions for unrestricted purposes.

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. MIRRLEES FUND, 1886, $2,500. Gift of James Buchanan Mirrlees. Income to such student in third or fourth year Mechanical Engineering most deserving pecuniary assistance.

823 JOHN D. MITSCH MEMORIAL FUND, 1946. Balance $2,635. Contributions toward memorial and children of the late Professor Mitsch.

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) expendable 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 $29,641.

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.

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.

WILLIAM E. NICKERSON FUND, 1928, $50,000. Gift. Principal and income used to finance chair in Humanics, 1928–40.

755 NUCLEAR SCIENCE AND ENGINEERING FUND, 1947. Present balance $15,236. For research.

MOSES W. OLIVER FUND, 1921, $12,870.49. Used for educational plant, 1938.

669 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.

827 CHARLES FRANCIS PARK MEMORIAL FUND, 1947, $5,500. For investment purposes.

323 THEODORE B. PARKER MEMORIAL FUND, 1945–46, $3,000. For special graduate scholarships.

483 GEORGE L. PARMELEE FUND, 1921, $17,641. Bequest. Income for tuition of either special or regular worthy students.

671 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.

FRANCES M. PERKINS FUND, 1912, $122,569.67. Bequest. Used for educational plant.

H. B. PERKINS FUND, 1940, $250. Bequest. Used for new equipment, 1940.

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. Present balance, $16,743. 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.

829 PRESIDENT'S FUND, SPECIAL, 1941–44, $10,500. Gifts. Principal and/or income to be used by President as desired.

CHARLES O. PRESCOTT FUND, 1935, $30,640.78. Principal and income used for educational plant, 1938.

487 FLORENCE E. PRINCE FUND, 1943, $7,689.28. Bequest. Income for aid to worthy students.

759 RADIOACTIVITY CENTER FUND, 1945. Balance, $30,215. 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, 1946–47, $2,500. For undergraduate scholarships.

863 RESERVE FOR USE OF FACILITIES FUND, 1945–47. Balance $145,999. Appropriated for renovation or improvement of physical plant and facilities. (See page 175 of this Report.)

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 $997.

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.

ROBERT E. ROGERS FUND, 1886, $7,600. Bequest in memory of his brother, William B. Rogers. Used for new equipment, 1940.

563 WILLIAM BARTON ROGERS FUND. Present balance $36,500. 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 $179,538.

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 $654. 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 $67,561.

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 Enginering.

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, 1930–46. Balance $16,285. 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 $56,274.

617 SENIOR HOUSE FUND, 1947, $500,000. Gift of Alumni Association from accumulated Alumni Fund, for new dormitory unit.

767 SERVOMECHANISMS RESEARCH FUND, 1943. Appropriation from Industrial Fund for postwar research. Present balance $47,738.

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, 1945–46, $300,000. For endowment of Professorship in Industrial Management.

769 SLOAN AUTOMOTIVE LABORATORY FUND, 1929–47, $215,000. Gift. Expended for automotive laboratory.

619 SLOAN FOUNDATION, 1946–47, $71,667.00. Expended for automotive laboratory.

673 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 $6,395.11.

957 WALTER B. SNOW FUND, 1938–47. Balance $17,475.04. Reserve funds of Technology Christian Association. Deposited for investment purposes.

251 SOLAR ENERGY FUND, 1938, $647,700. 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.

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.

771 SPECIAL RESEARCH (PADELFORD) FUND. Balance $2,626.42. For research.

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.

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 $2,894.

775 HENRY N. SWEET FUND, 1936, $8,036.50. Bequest. For industrial research. Present balance $11,110.72.

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 $15,000. For Research.

779 SWIFT PROTEIN RESEARCH FUND, 1944, $20,000. Gift. For research.

337 GERARD SWOPE GRADUATE FELLOWSHIPS FUND, 1945, $100,050. Gift. Income annually or from time to time to be granted as Gerard Swope Scholarships under certain conditions and with certain preferences. Principal to be maintained except under conditions presented.

835 TAU BETA PI MEMORIAL SCHOLARSHIP FUND, 1947, $1,245.50. 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 $123,389.

597 TECHNOLOGY LOAN FUND, 1930–41. Present balance $1,885,553.48 Contributed by eighteen alumni to provide loans for students.

959 TECHNOLOGY MATRON'S TEAS FUND, 1916–22–31, $8,500. Gifts of Mrs. F. Jewett Moore. Income for social activities of Technology Matrons.

839 TECHNOLOGY PRESS FUND, 1946. Balance $82,541. Royalties on books published.

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.

297 ELIHU THOMSON FUND, 1933–37, $23,680. 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.

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.

781 NELLIE FLORENCE TREAT FUND, 1944, $609. Bequest. For use in the field of Food Technology.

677 CHARLES A. TRIPP FUND, 1943, $100,000. Bequest. For dormitory construction — or such other use of all or part as may seem advisable.

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 $285,615.

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.

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 $1,764.87. Established by 1915 Technique Board from which recognized student activities may borrow if deemed necessary and desirable, at a low rate.

965 UNDERGRADUATE PUBLICATIONS TRUST FUND, 1935. Balance $8,855.43. Deposited by Alumni Advisory Council on Publications for investment purposes only.

967 UNDERGRADUATE DUES RESERVE FUND, ATHLETICS. Present balance $21,653.65. Transferred from Undergraduate Dues (current operating account) to secure investment income.

969 UNDERGRADUATE DUES RESERVE FUND, CONTINGENT. Present balance, $19,633.75. Transferred from Undergraduate Dues (current operating account) to secure investment income.

785 WILLIAM LYMAN UNDERWOOD FUND, 1932, $16,252. Bequest. For benefit of Biology Department or otherwise for general purposes.

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.

277 THEODORE N. VAIL FUND, 1925–42, $67,506. 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.

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 $13,095. For purposes of repair and renovation of the building.

867 WALKER MEMORIAL DINING SERVICE RESERVE FUND. Present balance $24,239. 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 $16,577. 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, 1930–46, $36,042.69. Bequest of Elizabeth Watson Cutter as a permanent fund. 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.

681 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, 1938–47, $242,802. 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 $518,000. 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, $11,500. Gift. For unrestricted purposes.

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 $26,660.

GEORGE WIGGLESWORTH, 1917–24, $65,000. Gift. Used for additional land purchase, 1924.

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, 1938–47. Balance $73,523.86. In Trust, subject to special annuity provisions.

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.)

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ADAMS, FREDERICK J. Technical Standards for Planning. *Am. Inst. Planners J.* 13, pp. 2–3, Winter, 1947.

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HITCHCOCK, HENRY-RUSSELL. The Architecture of Bureaucracy and the Architecture of Genius. *Arch. Review* (London) 101, pp. 3–6, January, 1947.

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HOYT, HOMER. Relative Value of Urban and Farm Real Estate in 1946. *Appraisal J.* 14, pp. 370–379, October, 1946.

KENNEDY, ROBERT W. New Patterns for Building. *House and Garden* 90, pp. 150, December, 1946.

KOCH, CARL, ROBERT W. KENNEDY and HUSON JACKSON. 3 New Houses at Snake Hill, Belmont, Mass. *Progressive Arch.* 27, pp. 52–66, October, 1946.

KOCH, CARL. What is the Attitude of the Young Practitioner towards the Profession? *Am. Inst. Arch. J.* 7, pp. 264–269, June, 1947.

WURSTER, WILLIAM W. General Offices of Charles L. Harney Co., San Francisco; Views and Floor Plans, Wurster, Bernardi & Emmons, Architects. *Arch. Forum* 85, pp. 104, 105, October, 1946.

WURSTER, WILLIAM W. Modesto House; Views and Floor Plans, Wurster, Bernardi & Emmons, Architects. *Progressive Arch.* 27, pp. 71–74, October, 1946.

WURSTER, WILLIAM W. Honoring Louis Sullivan. *Am. Inst. Architects J.* 6, pp. 209–213, November, 1946.

DEPARTMENT OF BIOLOGY

BEAR, RICHARD S. Review of *X-Ray Diffraction Studies in Biology and Medicine* by Mona Spiegel-Adolf and G. C. Henney. N. Y.: Greene and Stratton, 1947. *Science*, 105, p. 606, June 6, 1947.

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