

M.I.T. Redeploys for Peace

*Strengthened by an Outstanding Record of War Service,
the Institute Advances Its Educational Program
as Its Major Peacetime Responsibility*

BY JAMES R. KILLIAN, JR.

THE American scholar, to a degree without precedent, became a wandering scholar during World War II. Not only were he and his fellows distributed and redistributed geographically over the face of the earth; they were redistributed in function to a degree without precedent both in civilian and in military capacities.

Never isolated, even in peace, behind an ivory curtain, the M.I.T. staff in World War II became involved and redistributed to a greater extent than that of almost any other American institution. As a result, the M.I.T. staff was more completely diverted from education, although the Institute was actually enlarged as a war research organization. The concentration of war research on its campus, the presence here of a great assemblage of gifted scientists from hundreds of institutions, and the remarkably varied activities of its own staff, in Cambridge and elsewhere, all contributed in one overshadowing way to the establishment of a fresh and vigorous postwar program. No one at M.I.T. during this postwar period can fail to be impressed by the ferment of ideas, the prevailing temper to re-evaluate and to strike out in new directions, and the broadened concept of the Institute's responsibilities which is a direct outgrowth of the wholesale cross-fertilization that has resulted from the Institute's war program. The expanded commerce of thought resulting from these conditions is probably the most profound aftereffect which the war had on M.I.T.

Another effect of these special conditions was M.I.T.'s rapid war demobilization and its equally rapid mobilization for peace. The organization which had functioned to oversee \$100,000,000 of war research was geared to liquidate the war program expeditiously and at the same time to rebuild the long-term educational program. Those who served on the Institute's governing bodies during this period will long remember the excitement and urgency of reconversion. They will remember how a housing program for married veterans — the first in an American college — was planned and started before Federal funds became available. They will remember the improvisations to handle the tidal wave of applicants and how the limited classroom space was painstakingly utilized to the utmost to accommodate more than 3,000 students beyond the number registered at war's end. They will remember the search for new talent in the war-research laboratories, which, with the generous support of the Corporation, quickly brought to M.I.T. a remarkable group of outstanding graduate students and a number of major and

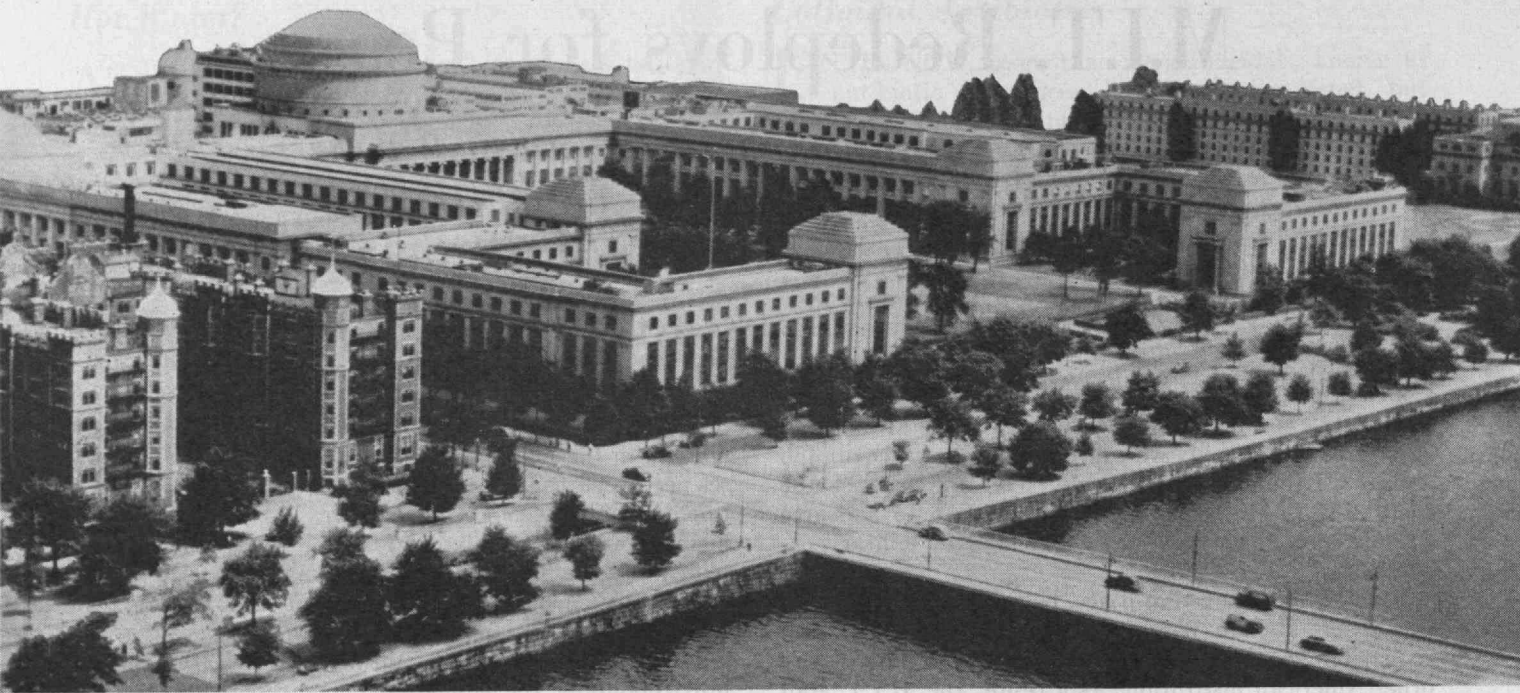
eminent Faculty appointments. In rapid succession new programs were adopted, as in food technology, in economics, in the humanities, in electronics, and in nuclear science; departments were rebuilt and given new direction, as in the School of Architecture and Planning; new facilities were blueprinted and financing started, as exemplified by the Gas Turbine Laboratory, the Research Laboratory of Electronics, the great Charles Hayden Memorial Library, and the Senior House.

While the staff was thus throwing its released energy into rebuilding the educational and research program, steady progress was being made in demobilizing the war-research organizations and in readapting buildings and equipment in a manner that could best serve the interest of the country and leave the Institute in as strong a position as possible for its expanded peacetime program. Both the temporary and permanent buildings erected for war work have been acquired by the Institute. This added space has not only enabled us to take care of the great increase in the student body but at the same time has both permitted and required a wholesale reallocation of space and renovation of equipment throughout the entire Institute plant. This general redistribution of space — the greatest since the Institute moved from Boston to Cambridge — together with the acquirement of new buildings, has required an expenditure of \$1,750,000. While this has been a very severe drain on the Institute's limited unrestricted funds, the Corporation felt the expenditure was warranted by the resulting gain in educational efficiency.

Adjustment to Expanded Enrollment

The great rush of redeployment after the end of World War II soon came face to face with an overwhelming enrollment of students in numbers greater than the Institute had ever handled before. Prior to the end of the war, two decisions had been reached: (1) M.I.T. would readmit all former students who had obtained leave for war service, and (2) M.I.T. had an obligation to accept a substantial temporary overload of students in order to share, to the limit of its ability and educational standards, in the national policy of providing educational opportunities for veterans. The result of these two decisions quickly became apparent, to an unexpected degree. Former students returned in larger numbers and more quickly than had been expected. Nearly 95 per cent decided to return to the Institute and in the fall of 1946, when but 700 had been expected, a total of 1,100 actually registered. In the meantime, applications were pouring in from veterans at a rate of about 4,000 a month for nine months and the tapering off has been at an astonishingly low rate. As a result the Institute found itself with 5,660 students in the

N.B. This article is reprinted from Chapter 20 of the forthcoming book *Q.E.D. — M.I.T. in World War II* by John Burchard, to be published in May by THE TECHNOLOGY PRESS (Cambridge), and John Wiley and Sons (New York).



No one at M.I.T. during this postwar period can fail to be impressed by the ferment of ideas, the prevailing temper to re-evaluate and to strike out in new directions, and the broadened concept of the Institute's responsibilities which is a direct growth of the whole cross-fertilization that has resulted from the Institute's war program.

fall term of 1947, to make a total 80 per cent greater than the largest prewar enrollment. The resultant load on staff and facilities has not been proportional to the increase in the number of students. It has been far greater since nearly every subject of study has had to be given every term, three terms a year. As a consequence the load on the staff has been excessive judged by any ideal long-range program. This becomes all the more apparent when it is remembered that, in addition to this large teaching commitment, the Institute's staff has the responsibility for directing a great research program, which in dollar expenditure will total more than \$10,000,000 in 1947-1948, nearly 20 times larger than any comparable program undertaken before World War II.

It is interesting to note that the number of people at M.I.T. during the 1946-1947 period totaled more than 8,000 or as many as during the peak of the war. Whereas during the war there were 2,000 students and 6,000 staff and nonstaff personnel, now there are more than 3,000 personnel and 5,660 students. Before the war approximately 1,500 people were employed, which is less than half of the present total.

Program for a New Era

The budget for 1947-1948 of nearly \$16,000,000 is more than four times the largest prewar budget. Of course the enlargement of our program and the overload which these statistics reflect have had a bearing on the Institute's reconversion. Under prevailing conditions there could be no return to prewar organization or leisure. Under the postwar conditions the Institute has come hard upon vitally important adjustments to insure its effectiveness as an educational institution.

Foremost among all our responsibilities is that of maintaining a strong educational program. In the wake of war's disruption, it has been necessary to retest programs, regain standards, and look ahead. Is our curriculum the best that we can devise to meet the conditions of the

postwar world? What are the optimum conditions for creative scholarship and research on the part of both students and staff? These basic questions are being examined by all the groups responsible for the management and conduct of the Institute, and significantly enough the current overload is not precluding this basic rethinking of our program.

The Faculty, for example, has appointed a Committee on Educational Survey to make a long-range study and re-evaluation of our curriculum and those policies which contribute to educational effectiveness. Under the chairmanship of Professor Warren K. Lewis, '05,* this committee has taken its assignment in great seriousness and has initiated a deeply probing study of those factors which contribute toward making an educational institution vigorous in scholarship and spirit. Not only is it reconsidering our undergraduate curriculum in the light of our prewar objectives but it is reaching out to determine what the objectives of the future should be in the training of scientists and engineers. Under the impetus provided by Dean Robert G. Caldwell's repointing of our humanities program, it is giving special attention to the problem of how best to relate the humanities to a professional curriculum and what kinds of training will best equip an engineer to handle the great social and public responsibility and power which must inevitably rest in his hands. And finally it is courageous enough to tackle some of the imponderables, mentioned above, which affect the "wanderings, alightings, fertilisings of man's thought." † What are those factors which we must emphasize at M.I.T. to provide the best possible environment for scholarly, creative work by our students as well as by our staff?

* Other members of the committee are: Professors John R. Loebourow, Ronald H. Robnett, C. Richard Soderberg, '20, and Julius A. Stratton, '23.

† "The Commerce of Thought," a lecture by Sir Arthur Quiller-Couch.

Concurrently with the study by the Committee on Educational Survey, other approaches to the problem are being followed. Under the leadership of Dean John W. M. Bunker, the Committee on the Graduate School has underwritten the high standards of graduate study here while at the same time providing greater flexibility to the individual student in pursuing his professional objectives. New ways of organizing and co-ordinating research with teaching are being tested and policies are formulated for handling sponsored research to the advantage of the academic program. During World War II we observed the effectiveness of research teams, and we are now experimenting to determine how best to reap the advantages of group research in an academic organization. We are certain that research teams should never displace the brilliant individualist who avoids entangling alliances, but we want to find out how the two approaches supplement and assist each other.

One of the devices which we are using to handle group research — and to stimulate individual work — is what we call centers of research. These are interdepartmental organizations which co-ordinate the co-operative activities of various departments in important fields of overlapping interests. While we call them centers of research because research is their predominant role, they are nevertheless playing a very important part in our educational program, especially by providing superior opportunities for senior- and graduate-student thesis work.

As the postwar program develops, other educational trends are clearly observable. There has been a fresh and constructive concern with teaching methods, and several departments have instituted carefully designed 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, all with the wholehearted interest of the departments.

In another direction, there is 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 and to educate engineers who have the temerity and capacity to dream and speculate beyond the boundaries of the immediately practical. Similarly the science departments have deepened 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, has brought science into full partnership.

Along with the deepening and broadening which come from a comprehensive understanding of physical laws, there is the broadening effect of humanistic study, which is receiving increased attention, as already noted in connection with the Committee on Educational Survey. Concurrently with the study by this committee, other approaches to the problem are being followed. The humanistic effects of extracurricular activities and the close integration of our humanities with supporting activities in the Technology community are being explored. In this direction, Everett Moore Baker, who was appointed dean of students on January 1, 1947, and Thomas P. Pitré, who became dean of freshmen at the same time, are exerting a powerful and liberalizing influence on the

student body, with a response from the students of instant and hearty appreciation. The registration officers in all of the several professional courses have stepped up their own effective contacts with students, and other 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. Out of a background of both psychiatry and internal medicine, he has made the Medical Department an important and liberalizing factor in safeguarding the health and promoting the morale of students and staff. 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 has been engaged and charged with the responsibility of making athletics serve education in the broadest sense.

Students at M.I.T. exhibit a similar interest in improving the environment and broadening the base of education at the Institute. With veterans returned from service comprising 60 per cent of the student body, we of course have an older and more mature group, but we also have a new interest in the values to be found in the field of the liberal arts. The present-day student usually has a well-thought-out program for his education and a willingness to work without stint to get ahead rapidly. Without any diminishment of his interest in professional subjects, he is willing to organize a liberal arts club; to organize a symphony orchestra; to sponsor (and to attend) lectures by prominent figures from nonprofessional fields; and to run carefully planned forums on such subjects as labor relations and universal military training.

Postwar Units and Personnel

Concomitantly with this broadening of interests of the staff and students has been a broadening of the Institute's planning for its future development. Instead of expecting that the major portion of the Institute will be east of Massachusetts Avenue, we now realize that the growth of M.I.T.'s educational facilities is certain to be so great that these facilities alone will require all of the land on the eastern half of the campus. The western tract of 50 acres is now conceived of as an area where we may develop really adequate student housing and recreational facilities and where a new type of campus development might be carried out which would have the dignity, beauty, and community living facilities that would contribute to the development of well-rounded men. In this area will be located the new Senior House, the Institute's first dormitory unit designed on the house plan and already under construction. Here, too, we hope to have other housing units, adequate playing fields, and a gymnasium so long needed and still unrealized.

The planning of facilities to promote a broadened education is epitomized in the concept for the Institute's Charles Hayden Memorial Library now being built.

The Charles Hayden Memorial Library is but one unit in the Institute's present program planned to implement the developments and new objectives. In addition to the library and west campus already mentioned, this program, ultimately involving a total expenditure of \$28,000,000, includes development of such new educational

facilities as a Metals Processing Laboratory,* a Hydrodynamics Laboratory and Naval Towing Tank, a Supersonic Wind Tunnel, now under construction, and a Gas Turbine Laboratory, already completed, and permanent buildings for the Research Laboratory of Electronics, the Laboratory for Nuclear Science and Engineering, and a Laboratory for Biology and Food Technology. In addition there are essential facilities for enriching student life, including the new gymnasium and the new Senior House, already mentioned, and, in behalf of the staff, a Faculty Club. The launching of this development program and the solicitation of funds to carry it through have been major undertakings of the redeployment period. Of the total of \$29,000,000, the equivalent of about \$9,000,000 has been secured, but the remaining \$20,000,000 must be raised. Actually the needs of M.I.T. are greatly in excess of this total, and the next five years must witness a sustained effort to enlarge capital resources of the Institute.

Is Our Staff the Best Possible?

This record would be incomplete without an estimate of the effects of World War II on the Institute staff and of the personnel changes made during the redeployment period. Before the war the Institute possessed a staff of magnificent capacity and scope. What is the situation today?

By any available test, the Institute has gained strength. Fortunately there were few losses; almost 100 per cent of the senior professors who were on leave are back. This was a major factor in the Institute's successful reconversion. While getting back its war service personnel, the Institute had an exceptional opportunity, as a result of its expanding program, to make a large number of major new appointments and to set high standards of selection in making these appointments. The war contacts of staff and administrative officers and the concentration in Cambridge of a great number of outstanding men during the war were major factors in assisting the Institute to spot men who met these high standards. In every major appointment we sought to answer affirmatively the ques-

* Announced in the April, 1948, Review.

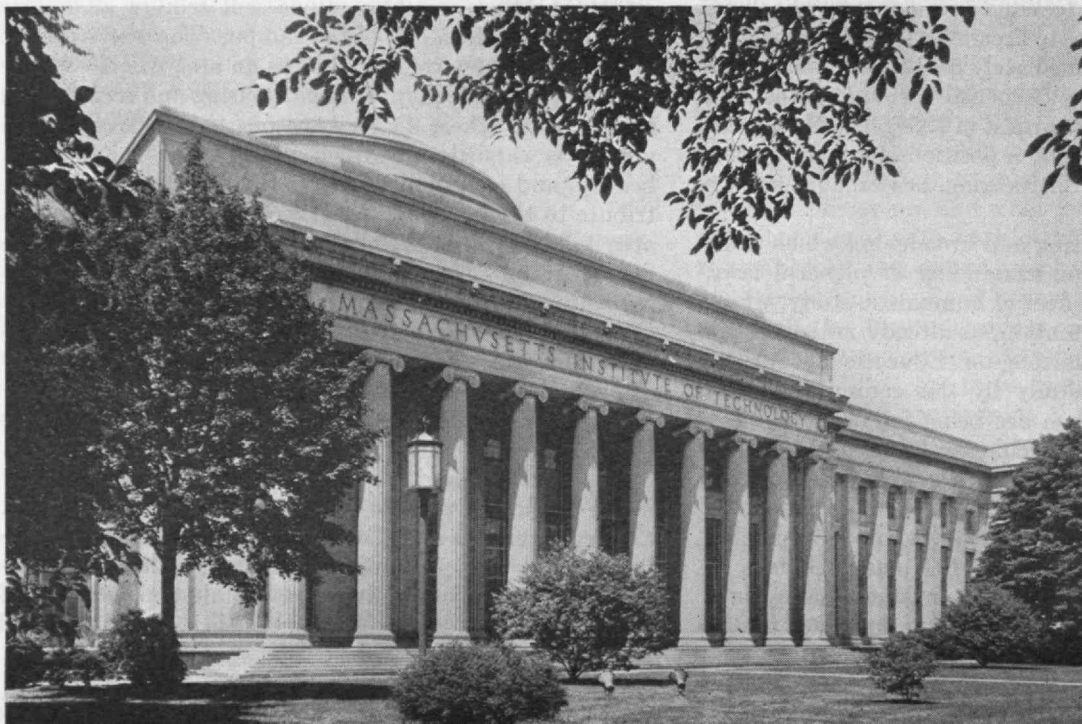
tion: Is the candidate the best available man in the country or even in the world to fill the post? Essentially the same question has also been asked in making promotions to the full professorship.

As a sampling, let me list some of the new appointments, omitting many outstanding younger members of the staff and limiting the list to those who now rank as full professors or who occupy positions of administrative responsibility.

Edward L. Moreland, '07, who withdrew from the deanship of engineering to become executive vice-president, part time, has been succeeded as dean of engineering by Professor Thomas K. Sherwood, '24, of the Department of Chemical Engineering. To the deanship of the School of Architecture and Planning has come William W. Wurster who had been in private practice in California. To the Office of Dean of Students has come Everett Moore Baker, a minister from Cleveland. A new post has been created, carrying the title of director of libraries, and this has been filled by John E. Burchard, '23, Director of the Bemis Foundation. To replace William N. Seaver, who retired for age, Vernon D. Tate of the National Archives has become librarian. Dr. Dana L. Farnsworth has become medical director.

Among recent appointments to department headships are Arthur C. Cope, who came from Columbia to head the Department of Chemistry; William T. Martin, who came from Syracuse University and is now head of the Department of Mathematics; Vice-admiral Edward L. Cochrane, '20, who comes from the Navy Department, where he has been chief of the Bureau of Ships and more recently chief of the Material Division, to head the Department of Naval Architecture and Marine Engineering; and William L. Campbell, '15, who came from industry to head the Department of Food Technology. From our own staff came C. Richard Soderberg, '20, to head the Department of Mechanical Engineering, John B. Wilbur, '26, to head the Department of Civil and Sanitary Engineering, and John Chipman to head the Department of Metallurgy.

Julius A. Stratton, '23, of the Department of Physics was appointed head of the Research Laboratory of Electronics, and Jerrold R. (*Concluded on page 404*)



Is our basic curriculum the best that we can devise to meet conditions of the postwar world? What are the optimum conditions for creative scholarship and research on the part of both students and staff? These basic questions are being examined by all groups responsible for the management and conduct of the Institute.

WILLIAM D. NEUBERG CO., INC.

Chemicals

GRAYBAR BUILDING 420 LEXINGTON AVE.

NEW YORK 17, N. Y.

TELEPHONE LEXINGTON 2-3324

CABLE—"WILNEUBERG"

J. C. CORRIGAN CO., INC.

Conveyers

Engineers • Manufacturers • Erectors
Coal Handling Systems
Materials Handling Equipment
Portable Conveyors

Distributors for

Jeffrey Manufacturing Co.
Jeffrey Parts Carried in Boston Stock

41 Norwood Street, Boston 22, Mass.

Tel. GENeva 0800



Transits and Levels are used on all largest works and by U. S. Govt. for utmost precision. Rental lists, New catalog, *free* issued, sent gratis. A souvenir plumb-bob sent for 3¢ postage.

BUFF & BUFF CO. Boston 30, Mass.
Henry A. Buff '05

William H. Coburn, '11

William F. Dean, '17

William H. Coburn & Co.

INVESTMENT COUNSEL

68 Devonshire St.

Boston, Mass.



PRECISION-GAUGED
HAIRSPRINGS
AND
FINE ROLLED WIRE

PRECISION PRODUCTS COMPANY
WALTHAM, MASSACHUSETTS

ROBERT I. BRADLEY '20

TEXTILE REQUIREMENTS CONFLICT

(Concluded from page 407)

Review of these approaches throws some light on the balance of the textile research program undertaken by the armed forces. Compromise is a function of applied research and is reached after a planned investigation of the effect of the base material, the construction, and the finish. Elimination is achieved through uninhibited questioning of all military requirements by responsible analysts and by a constantly dubious attitude on the part of technologists striving to attain the required properties. Circumvention varies in its demand for applied *versus* fundamental research depending on the problem at hand. In this technique the problem may be avoided by application of an entirely different phenomenon without incurring the previous conflict. Where the scientist must develop basic facts about the properties of the substitute material or process, the problem becomes more fundamental than when he can use the results of the work of others. Synthesis represents head-on attack of the conflicting requirements which constitute the difficulty, with no thought of compromising or circumventing; it assumes that there is an ideal solution to the problem and seeks to uncover it by careful consideration of the fundamentals underlying each phenomenon involved.

Each problem requires separate consideration and there is no attempt on the part of Army research administrators to limit the balance of research under an arbitrarily established quota system. The challenge is directed to the individual project engineer, chemist, or physicist and it is his responsibility to exhaust each approach. We all stand to receive definite advantage from such research and the benefit received is on a common and personal basis rarely matched by other military studies. This point of view has been pungently expressed by one eminent physical chemist who said in considering the problem of wear resistance: "This interests me — it is as personal as the seat of my trousers!"

MAIL RETURNS

(Continued from page 364)

Unfortunately, railroad managements committed to the purchase and use of expensive Diesel power must go further and see that the Diesels are utilized regardless of cost. This quite frequently means that skilled personnel are diverted entirely from steam-locomotive servicing and all available man power is put to work to get the most out of the Diesels. Frequently, we hear that trains are actually held to make Diesels available.

While very little attempt has been made to do so, steam locomotives can be designed and built to outperform Diesels in many cases, and economically speaking, to equal the performance in the others. But to do this universally both the railroads and builders would have to adopt a program something like this: standardize power for certain services; design into steam-power units the advantages already known and which will materially improve performance; equip shops for expediting maintenance, similar to the Diesel shops; give steam power the same expert attention that now obtains for Diesels; have the best fuel available for steam engines, as is the present practice for Diesels; improve back-shop techniques to reduce overhaul costs; train men to do jobs as correctly and efficiently on steam locomotives as on Diesels; make comparisons with only modern Diesels *versus* modern steam on an equal basis as to tonnage and other significant factors.

(Concluded on page 410)