

THIRTIETH ANNUAL REPORT
OF THE
NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS

1944

INCLUDING TECHNICAL REPORTS
NOS. 774 to 803



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THIRTIETH ANNUAL REPORT

OF THE

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

FOR 1944

Washington, D. C., April 1, 1949.

The Thirtieth Annual Report of the National Advisory Committee for Aeronautics covers the fiscal year 1944, and includes Technical Reports Nos. 774 to 803. Because of wartime security requirements, the Committee did not then prepare a formal report of its activities during the fiscal year 1944, and the Technical Reports published in this volume were also withheld from general distribution at that time.

A summary of important research activities of the Committee during the war years was presented in the Thirty-second Annual Report of the Committee for the fiscal year 1946, published in 1947.

The National Advisory Committee for Aeronautics was established by Act of Congress, approved March 3, 1915 (U. S. C. title 50, sec. 151), to "supervise and direct the scientific study of the problems of flight with a view to their practical solution" and to "direct and conduct research and experiment in aeronautics" in such laboratories as may be placed under its direction. In 1944, the Committee had three major research stations: the Langley Memorial Aeronautical Laboratory, at Langley Field, Va.; the Ames Aeronautical Laboratory, at Moffett Field, Calif.; and the Aircraft Engine Research Laboratory, at Cleveland, Ohio.

In 1944 America's heavy investment in the achievement of superior air power yielded impressive returns in terms of destruction of German war supply centers. German air opposition was almost overcome by tactically superior fighter aircraft. Bombers, in great numbers, operating with fighter escort, effectively reduced the production of German industrial plants, disrupted transportation, and weakened Germany's military power.

By the middle of the fiscal year 1944, America had achieved definite superiority over the Japanese in all elements of air power.

In the meantime, work in the laboratories of the NACA was directed largely to determining means for

increasing the performance and military effectiveness of American combat aircraft, including types already in service and new types under development. The exacting and varied conditions of global combat required technological improvements with changing emphasis from week to week. Combat flying under virtually every condition of climate and geography; at high and low altitudes; at extreme ranges; from carrier decks, as well as from sandy, coral and grass landing fields, posed problems, the solutions for which lay partly but importantly in aerodynamics, propulsion, and structures research laboratories. Along with the need for coping with such combat conditions, performance requirements rose steadily in order that air superiority could be maintained and that the war could be brought to a speedy and decisive end.

While such immediate problems were being met, it was necessary to look ever forward to new developments. While the war was being fought with reciprocating-engine aircraft, jet-propelled aircraft were under intense development by the Germans, British, and Americans. If the war were to last until such craft came into general use, they would influence markedly the strategy and tactics of the war in the air. Therefore, research was accelerated on jet-propulsion systems and preparations were made for a vast program of development. The Germans were the only belligerents to make extensive use of jet-propelled aircraft where short range was to their operating advantage. They were, however, employed too late to be decisively effective. Nevertheless, the way was pointed to new speed and performance ranges resulting from this new form of propulsion, and our research laboratories were at work on the problems involved.

During the year, the following change was made in the main Committee:

On February 10, 1944, Mr. William Littlewood, M. E., succeeded Dr. George J. Mead as a member from private life.



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The main Committee is assisted by a number of technical committees and subcommittees which recommend research programs in the various specialized fields. These committees are composed of representatives of government agencies and individuals from industry and educational institutions, who are chosen on the basis of their personal knowledge of the special fields and who serve as committee members without pay. The members are selected with a view to assisting the main Committee with well informed advice in all the specialized fields of research.

The formation of technical committees and subcommittees follows the current research needs. Certain changes were made in the technical committees in 1944; the Committees on Aircraft Materials and Aircraft Structures were merged in a new Committee on Aircraft Construction. A new committee was formed on materials research coordination; the Committee on Jet Propulsion was dissolved, its work having been completed, and now incorporated in propulsion research.

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 Mr. Jerome Lederer, Airlines War Training Institute.

Subcommittee on Meteorological Problems

Dr. Francis W. Reichelderfer, United States Weather Bureau, Chairman.
 Col. Marcellus Duffy, U. S. A., A. A. F. Liaison Office, Ground Signal Agency.
 Maj. J. J. George, U. S. A., Office of Director of Weather.
 Capt. A. F. Spilhaus, U. S. A., A. A. F. Liaison Office, Ground Signal Agency.
 Dr. Ross Gunn, Naval Research Laboratory.
 Comdr. Howard T. Orville, U. S. N., Bureau of Aeronautics, Navy Department.
 Dr. William J. Humphreys, United States Weather Bureau.
 Mr. Delbert M. Little, United States Weather Bureau.
 Mr. George M. French, Civil Aeronautics Board.
 Mr. Eugene Sibley, Civil Aeronautics Administration.
 Mr. Richard V. Rhode, NACA Langley Memorial Aeronautical Laboratory.
 Mr. C. E. Buell, American Airlines, Inc.
 Prof. H. G. Houghton, Massachusetts Institute of Technology.
 Mr. E. J. Minser, Transcontinental and Western Air, Inc.
 Dr. Carl G. Rossby, University of Chicago.

Special Subcommittee on Lightning Hazards to Aircraft

Mr. Delbert M. Little, United States Weather Bureau, Chairman.
 Lt. Col. E. H. Schwartz, U. S. A., A. A. F. Matériel Command.
 Lt. Col. Peter C. Sandretto, U. S. A., Electronics Unit, First Proving Ground.
 Dr. Ross Gunn, Naval Research Laboratory.
 Lt. Comdr. F. G. Kear, U. S. N. R., Bureau of Aeronautics, Navy Department.
 Mr. L. P. Harrison, United States Weather Bureau.
 Mr. Joseph C. Hromada, Civil Aeronautics Administration.
 Dr. F. B. Silsbee, National Bureau of Standards.
 Dr. O. H. Gish, Carnegie Institute of Washington.
 Dr. Karl B. McEachron, General Electric Co.
 Mr. E. J. Minser, Transcontinental and Western Air, Inc.
 Prof. E. J. Workman, University of New Mexico.

Subcommittee on De-Icing Problems

Mr. Karl Larson, Northwest Airlines.
 Lt. M. Tribus, U. S. A., A. A. F. Matériel Command.
 Mr. Clare I. Valentine, A. A. F. Matériel Command.
 Lt. D. C. Simpson, U. S. N. R., Bureau of Aeronautics, Navy Department.

EXPANSION OF FACILITIES

During the fiscal year, the following research facilities were completed and placed in operation:

**AMES AERONAUTICAL LABORATORY,
 MOFFETT FIELD, CALIFORNIA**

In January of 1944, the 1- by 3½-foot high-speed tunnel was completed, providing a valuable auxiliary facility to the 16-foot tunnel for preliminary investigations of high-speed problems with the greatest possible economy. In June of 1944, the 40- by 80-foot tunnel was completed. This is the largest full-scale tunnel in the world, making possible fundamental research at large Reynolds numbers as well as rapid corrective studies of military aircraft in the design and production stages.

**AIRCRAFT ENGINE RESEARCH LABORATORY,
 CLEVELAND, OHIO**

Most of the research facilities initially planned for the Cleveland Laboratory were completed during the fiscal year 1944. The Engine Research Building was completed in August of 1943. This unit houses a large number of laboratories and test cells for research on complete engines and their components. Included are combustion research, compressor and turbine research, study of materials, and friction and wear. The equipment involves extensive services for supplying refrigerated, compressed, and evacuated air in large volumes.

In January of 1944 the Altitude Tunnel was put in operation. This is the first tunnel in this country where complete aircraft engines can be studied in operation under accurately simulated conditions of high altitudes. In March of 1944 the Icing Research Tunnel was completed. This is a specialized tunnel for investigation of aircraft and engine components under simulated icing conditions. In May of 1944 the second engine-propeller test house was completed. This unit is designed for investigation of power plant installations complete with propellers.

Mr. Alan L. Morse, Civil Aeronautics Administration.
 Mr. B. C. Haynes, United States Weather Bureau.
 Mr. John W. Crowley, Jr., NACA Langley Memorial Aeronautical Laboratory.
 Mr. Willson H. Hunter, NACA Aircraft Engine Research Laboratory.
 Mr. Lewis A. Rodert, NACA Ames Aeronautical Laboratory.
 Dr. W. C. Geer.
 Prof. H. G. Houghton, Massachusetts Institute of Technology.
 Mr. Ralph S. Johnson.
 Mr. Lynn A. Williams, Jr., Stewart-Warner Corp.

SPECIAL COMMITTEE ON MATERIALS RESEARCH COORDINATION

Dr. George W. Lewis, National Advisory Committee for Aeronautics, Chairman.
 Mr. J. B. Johnson, A. A. F. Matériel Command.
 Capt. J. E. Sullivan, U. S. N. R., Bureau of Aeronautics, Navy Department.
 Lt. Comdr. Bruce S. Old, U. S. N. R., Office of Coordinator of Research and Development, Navy Department.
 Mr. Albert A. Vollmecke, Civil Aeronautics Administration.
 Dr. Clyde Williams, Battelle Memorial Institute.
 Dr. Maurice Nelles, War Production Board.

FINANCIAL REPORT

Appropriations for fiscal year 1944.—Funds in the following amounts were appropriated for the Committee for the fiscal year 1944 in the Independent Offices Appropriation Act, 1944, approved June 26, 1943; the First Supplemental National Defense Appropriation Act, 1944, approved December 23, 1944; and the First Deficiency Appropriation Act, 1944, approved April 1, 1944:

Salaries and expenses.....	\$19,620,415
Printing and binding.....	15,000
Construction and equipment of laboratory facilities:	

Langley Memorial Aeronautical Laboratory..	8,864,200
Ames Aeronautical Laboratory.....	5,956,600
Aircraft Engine Research Laboratory.....	3,936,000

Total appropriations.....	38,302,215
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Obligations incurred during the fiscal year 1944 are listed below. The figures shown are total obligations and include the costs of personal services, travel, transportation, communication, utility services, contractual services, supplies, and equipment.

Salaries and expenses:	
Headquarters Office, Washington, D. C.....	\$416,580
Langley Memorial Aeronautical Laboratory..	7,667,537
Ames Aeronautical Laboratory.....	2,535,380
Aircraft Engine Research Laboratory.....	7,972,424
Research contracts—educational institutions..	202,455
Transfer to Bureau of Standards.....	131,634
Printing and binding, all activities.....	10,456
Construction and equipment of laboratory facilities: ¹	

Langley Memorial Aeronautical Laboratory..	6,827,132
Ames Aeronautical Laboratory.....	3,332,924
Aircraft Engine Research Laboratory.....	2,947,975

Total obligations.....	32,044,497
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Unobligated balances:	
Salaries and expenses.....	694,405
Printing and binding.....	4,544
Construction and equipment ²	5,648,769

Total appropriations.....	38,302,215
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¹ Includes obligations incurred against prior year appropriations available for obligation in fiscal year 1944.

² Remains available for obligation in future fiscal years.