

**TWENTY-NINTH ANNUAL REPORT**  
**OF THE**  
**NATIONAL ADVISORY COMMITTEE**  
**FOR AERONAUTICS**

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**1943**

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**INCLUDING TECHNICAL REPORTS**

**NOS. 752 to 773**



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Collection, classification, compilation, and dissemination of scientific and technical information in aeronautics

# TWENTY-NINTH ANNUAL REPORT

OF THE

## NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

FOR 1943

WASHINGTON, D. C., *October 1, 1948.*

The Twenty-ninth Annual Report of the National Advisory Committee for Aeronautics covers the fiscal year 1943, and includes Technical Reports Nos. 752 to 773. Because of wartime security requirements, the Committee did not currently prepare a formal report of its activities during the fiscal year 1943, and the Technical Reports of that year published in this volume were also currently withheld from general distribution.

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 49, sec. 241). Its duty under the law is to "supervise and direct the scientific study of the problems of flight with a view to their practical solution." It is also authorized to "direct and conduct research and experiment in aeronautics" in such laboratories as may be placed under its direction. The Committee has three major research stations—the Langley Memorial Aeronautical Laboratory, at the Army's Langley Field, Va.; the Ames Aeronautical Laboratory, at the Navy's Moffett Field, Calif.; and the Aircraft Engine Research Laboratory, at the Cleveland Municipal Airport, Cleveland, Ohio.

During 1943 the Committee's research effort was directed toward increasing the military effectiveness of America's aeronautical weapons. Military aircraft designs were based chiefly on research data accumulated prior to World War II. The Committee was in a key position to work with the military services and the aircraft industry in applying effectively the data to new aircraft and engine designs and to improvement of existing designs. Each mile-per-hour of speed gained; each additional mile of range; and each degree of improved maneuverability and handling qualities of aircraft was of great tactical and strategic importance.

Important gains in aircraft performance were made through the use of improved wing and body configurations and through the reduction of drag resulting from the unnecessary projection of various aircraft components outside the basic contour of the craft, from unnecessary roughness of

surfaces, from unintentional leakage of air through the airplane structure, and from the use of large quantities of excess air for various cooling functions.

The first research project at the new Aircraft Engine Research Laboratory, at Cleveland, Ohio, was begun in March 1942, 3 months prior to the beginning of the fiscal year 1943. As the facilities at Cleveland came into service, the research program on the reciprocating engine for military use was considerably expanded. Increased power and range were the principal research objectives at that time. Because of the great increase in the quantities of fuel required by the military forces and because of the critical supply of aviation fuel constituents, the research program on fuels and combustion was accelerated on an extensive scale at Cleveland.

Because of the unusual loads imposed on aircraft structures under combat flight conditions, considerable research effort was concentrated on the improvement of structural design to permit safe operation. The completion of a new Structures Research Laboratory at Langley just prior to the fiscal year 1943 permitted the necessary extension of this important research work.

Despite the fact that a considerable portion of the Committee's effort was in applied wartime research during the year 1943, basic research studies were carried on where it seemed probable that their results would, during World War II, find application for military purposes. Because speed is a most important characteristic of military aircraft, the problems of high-speed flight were attacked vigorously by the Committee. New high-speed wind tunnels were under construction both at the Langley and the Ames laboratories. A 9-inch Supersonic Wind Tunnel was completed in July 1942, with which earlier investigations in the field of supersonic aerodynamics were extended. At the same time the prospects of high-speed flight through the use of the gas-turbine jet-propulsion engine led to the building of two jet-propulsion test cells at the Cleveland laboratory. Experiments were conducted in these facilities on the first turbo-jet engines built in this country.

On April 9, 1943, the President appointed Rear Admiral Ernest M. Pace, U. S. N., a member of the National Advisory Committee for Aeronautics, succeeding Rear Admiral Sydney M. Kraus, U. S. N. This was the only change in membership of the Committee in 1943.



## TECHNICAL COMMITTEES

The main Committee is assisted by a number of technical committees and subcommittees which recommend to it research programs in the various specialized fields. These groups 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 without pay as such. The members of technical committees are selected with a view to providing the main Committee with well-informed expert groups of advisers in each of the respective fields.

The membership of these committees in 1943 follows. The nature and scope of each committee's activities are evident from its name.

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 Dr. Ross Gunn, Naval Research Laboratory.  
 Maj. J. J. George, Joint Army Navy Weather Central.  
 Thomas B. Bourne, Civil Aeronautics Administration.  
 George M. French, Civil Aeronautics Board.  
 Dr. William J. Humphreys, U. S. Weather Bureau.  
 Delbert M. Little, U. S. Weather Bureau.  
 Dr. George W. Lewis, National Advisory Committee for Aeronautics (ex officio).  
 Richard V. Rhode, National Advisory Committee for Aeronautics.  
 C. E. Buell, American Airlines, Inc.  
 Prof. H. G. Houghton, Massachusetts Institute of Technology.  
 E. J. Minser, Transcontinental & Western Air, Inc.  
 Dr. Carl G. Rossby, University of Chicago.  
 Capt. A. F. Spilhaus, U. S. A.

**SPECIAL SUBCOMMITTEE ON LIGHTNING HAZARDS TO AIRCRAFT (UNDER SUBCOMMITTEE ON METEOROLOGICAL PROBLEMS)**

Delbert M. Little, U. S. Weather Bureau, Chairman.  
 Maj. E. H. Schwartz, U. S. A., Air Technical Service Command.  
 Lt. Col. Pete Sandretto, U. S. A., Electronics Unit, Eglin Field, Fla.  
 Lt. Comdr. F. G. Kear, U. S. N. R., Bureau of Aeronautics, Navy Department.  
 Dr. Ross Gunn, Naval Research Laboratory.  
 Joseph C. Hromada, Civil Aeronautics Administration.  
 L. P. Harrison, U. S. Weather Bureau.  
 Dr. F. B. Silsbee, National Bureau of Standards.  
 Dr. George W. Lewis, National Advisory Committee for Aeronautics (ex officio).  
 Dr. O. H. Gish, Carnegie Institution of Washington.  
 Dr. Karl B. McEachron, General Electric Co.  
 E. J. Minser, Transcontinental & Western Air, Inc.  
 Prof. E. J. Workman, University of New Mexico.

**SUBCOMMITTEE ON DE-ICING PROBLEMS**

Karl Larson, Northwest Airlines, Chairman.  
 Lt. Col. Rudolph Fink, U. S. A., Air Technical Service Command.  
 Lt. D. C. Simpson, U. S. N. R.  
 Mr. Clare I. Valentine, Army Air Forces.  
 Alan L. Morse, Civil Aeronautics Administration.  
 B. C. Haynes, U. S. Weather Bureau.  
 John W. Crowley, Jr., National Advisory Committee for Aeronautics.  
 Dr. George W. Lewis, National Advisory Committee for Aeronautics (ex officio).

L. A. Rodert, National Advisory Committee for Aeronautics.  
 Dr. W. C. Geer.  
 Prof. H. G. Houghton, Massachusetts Institute of Technology.  
 Willson H. Hunter, National Advisory Committee for Aeronautics.  
 Ralph S. Johnson, United Air Lines.  
 Lynn A. Williams, Jr., Stewart-Warner Corp.

#### SPECIAL COMMITTEE ON JET PROPULSION

Dr. W. F. Durand, Stanford University, Chairman.  
 Prof. C. Richard Soderberg, Massachusetts Institute of Technology,  
 Vice Chairman.  
 Col. Donald J. Keirn, U. S. A., Air Technical Service Command.  
 Rear Admiral S. M. Kraus, U. S. N., Bureau of Aeronautics, Navy  
 Department.  
 Capt. S. B. Spangler, U. S. N., Bureau of Aeronautics, Navy Depart-  
 ment.  
 Dr. Hugh L. Dryden, National Bureau of Standards.  
 Dr. George W. Lewis, National Advisory Committee for Aeronautics  
 (ex officio).  
 R. C. Allen, Allis-Chalmers Manufacturing Co.  
 Dr. L. W. Chubb, Westinghouse Electric and Manufacturing Co.  
 Prof. A. G. Christie, Johns Hopkins University.  
 Dr. A. R. Stevenson, Jr., General Electric Co.  
 Prof. E. S. Taylor, Massachusetts Institute of Technology.

#### EXPANSION OF FACILITIES

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

##### AIRCRAFT ENGINE RESEARCH LABORATORY, CLEVELAND, OHIO

In November 1942 the Fuels and Lubricants Building was completed.

In March 1943 the Administration Building was completed, containing central offices, library and auditorium.

##### LANGLEY MEMORIAL AERONAUTICAL LABORATORY, LANGLEY FIELD, VA.

A 9-inch supersonic wind tunnel was completed in July 1942 providing the laboratory with a facility for general supersonic research. In October 1942 a second hydrodynamic towing tank was completed, providing a significant increase in the laboratory's facilities for hydrodynamic research work, including work on the subject of landplanes descending at sea.

#### FINANCIAL REPORT

##### Appropriations for the fiscal year 1943

Funds in the following amounts were appropriated for the Committee for the fiscal year 1943 in the Independent Offices Appropriation Act, 1943, approved June 27, 1942;

the First Deficiency Appropriation Act, 1943, approved March 18, 1943; and the Urgent Deficiency Appropriation Act, 1943, approved July 12, 1943:

Salaries and expenses.....	\$13, 088, 736
Printing and binding.....	25, 000
Construction and equipment of laboratory facilities:	
Langley Memorial Aeronautical Laboratory.....	141, 000
Ames Aeronautical Laboratory.....	3, 000, 000
Aircraft Engine Research Laboratory.....	9, 174, 000
<b>Total appropriations.....</b>	<b>25, 428, 736</b>

Obligations incurred during the fiscal year 1943 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.....	\$371, 353
Langley Memorial Aeronautical Laboratory.....	6, 002, 447
Ames Aeronautical Laboratory.....	1, 604, 651
Aircraft Engine Research Laboratory.....	4, 559, 693
Transfer to the National Bureau of Standards.....	142, 300
Research contracts—educational institutions.....	303, 302
Printing and binding, all activities.....	19, 993
Construction and equipment of laboratory facilities: <sup>1</sup>	
Langley Memorial Aeronautical Laboratory.....	82, 831
Ames Aeronautical Laboratory.....	3, 132, 664
Aircraft Engine Research Laboratory.....	3, 783, 375
<b>Total obligations.....</b>	<b>20, 092, 609</b>

Unobligated balances:	
Salaries and expenses.....	14, 990
Printing and binding.....	5, 007
Construction and equipment <sup>2</sup> .....	5, 316, 130
<b>Total appropriations.....</b>	<b>25, 428, 736</b>

<sup>1</sup> Includes obligations incurred against prior year appropriations available for obligation in fiscal year 1943.

<sup>2</sup> Remains available for obligation in future fiscal years.

##### Appropriations for the 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, 1943; 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
<b>Total appropriations.....</b>	<b>38, 392, 215</b>