AERONAUTICAL RESEARCH SCIENTIST

$3397 to $9975 per year

with the National Advisory Committee for Aeronautics

for research-minded scientists with training in

ENGINEERING, PHYSICS, CHEMISTRY, MATHEMATICS

or related physical sciences, AND demonstrated ability to do research in fundamental problems related to aeronautics. The
ability must relate to some type or types of basic research performed in NACA laboratories, such as the following:

Aerodynamics, both theoretical and experimental, including compressible flow, stability and control, air loads, flutter, and special problems related to aircraft and missiles such as induction of air, propellers, helicopters, hydrodynamics, and physics of the upper atmosphere.

Mechanics of static or moving bodies and structures, both theoretical and experimental, including stability of monocoque structures, dynamic and vibratory stresses, stress distribution, etc., for both airframes and propulsion units.

Thermodynamics, both theoretical and experimental, including heat transfer, heat engine cycles, performance of compressors and turbines, etc.

Electronics, electrical measurements, radio, telemeasuring, servomechanisms or mechanics as applied in aeronautical research instrumentation.

Optics, interferometry, or spectroscopy, as applied in aeronautical research instrumentation.

Combustion processes in rockets, ram jets, gas turbines, or reciprocating engines, including chemical thermodynamics, combustion reaction kinetics, physical chemistry of fuels and combustion, etc.

Physical or chemical metallurgy; ceramics; X-ray diffraction techniques.

Lubrication, including dynamics of surfaces in sliding and rolling contact.

Flight research involving piloting of specially instrumented aircraft and analysis of scientific and engineering data.

Mathematics as applied to subsonic or supersonic aerodynamics, theory of structures, mechanical or thermal strains, heat transfer, diffusion, lubrication, fatigue, or other problems related to aeronautical research.

No written test is required. Ratings will be made on an evaluation of education and experience. Research ability of applicants will be determined on the basis of research projects worked on or reports prepared, and information furnished by college instructors, supervisors, and research associates. A good general background in physics or chemistry, as appropriate, is necessary for all aeronautical research except applied mathematical research; mathematics is a necessary tool in all aeronautical research.

PURPOSE: The National Advisory Committee for Aeronautics needs research scientists of superior capacity for specialized investigations of fundamental problems related to aeronautics. This open competitive examination is being announced for the purpose of obtaining eligibles for appointment, on a probational basis, to positions described herein at the Washington Headquarters and at Field Laboratories of the NACA.

LOCATION OF POSITIONS: Most of the positions are located at the various NACA field laboratories. Although a few positions are located in the NACA Washington Headquarters, most Washington positions, however, are filled by the reassignment of employees who have had experience in one of the NACA laboratories. The locations are as follows:

A. The headquarters of the NACA in Washington, D. C.
B. The NACA Langley Memorial Aeronautical Laboratory, Hampton, Virginia
C. The NACA Ames Aeronautical Laboratory, Moffett Field, California
D. The NACA Aircraft Engine Research Laboratory, Cleveland, Ohio

CLOSING DATE: Applications will be accepted until further notice. However, persons interested in being considered for positions which are to be filled immediately should have their applications on file not later than May 1, 1947.

GENERAL DESCRIPTION OF WORK

The work of the NACA is to solve the fundamental problems of flight. This work is accomplished by means of basic research, consisting of the development of theories and the experimental investigations needed for the prediction and explanation of aeronautical phenomena. The information obtained from this basic research is disseminated through publications and reports available to workers in the aeronautical field. The application of this information results in continual development and improvement of the nation’s aircraft.

The positions to be filled cover a wide variety of professional aeronautical research work. An appointee entering upon duty is assigned a research problem appropriate to his education and experience and, where necessary, is assigned an individual course of supervised study to prepare him to solve the problem. Successive problem assignments are, in general, of increasing difficulty in order to bring the appointee up to the frontiers of present knowledge in the shortest possible time and in such a way that he has learned how to use the available theoretical and experimental tools in advances beyond the present frontiers.

Research work in the NACA is, in effect, a continuation of university postgraduate training and research.

The experimental research facilities of the three laboratories of the NACA, which are used for exploring the applicability of aeronautical and related theory, include a large number of wind tunnels of both subsonic and supersonic range, equipment for investigating aircraft propulsion systems, and a wide variety of other research equipment.
TYPES OF DUTIES

Following are a few examples of the kinds of work covered under this examination. In each case, the preparation of reports and experimental work is part of the job. The examples are not all-inclusive, but indicate the variety and scope. They describe areas of work rather than the duties of specific positions.

(A) Appointees will make theoretical and experimental studies of the airflow in and about aircraft components and components of aircraft structures. They will study the characteristics of shock waves, boundary layers, and their interaction, and of the motions of an aircraft when subjected to certain control movements or other disturbances. Specific problems will be studied with respect to specific forms of components, such as wings, control surfaces, and internal flow passages when local flow velocities equal or exceed the local speed of sound. These analyses, together with existing aerodynamic theories and test data, will be utilized to improve previously developed theories and to evolve new generalizations.

(B) Appointees will be assigned research in such fields of aircraft structures as stress distribution and stability of shell type structures and dynamic problems in aircraft structures and power plants, or in materials research, plasticity problems, and fatigue. In most cases, the approach to problems in this field will be analytical, with a subsequent confirmation of the results by experimental means.

(C) Appointees will be concerned with the investigation of the parameters affecting the design of engine components; the cycle analysis of various propulsion systems with due consideration of aerodynamic and thermodynamic factors; heat transfer as applied to engine cooling, heat exchangers, regenerators, and rocket combustion chambers; vibration of engine parts; and control mechanisms.

(D) Appointees will be concerned with the application of mathematics to problems in mechanically and aerodynamically induced vibrations of airframe and engine components; development of methods for solution of differential and integral equations associated with the subsonic and supersonic flow around isolated aerodynamic bodies and bodies in cascade; extension of the mathematical basis for the solution of aerodynamic problems by analogy with other fields of physics; problems in stress and creep of materials; methods for employing new computing machines and analyzers for the rapid processing of research data and problems; establishment of procedures for analyzing research data; and mathematical computing for other laboratory activities.

(E) Appointees will be concerned with research work in instrumentation in a wide field, covering the multitude of measurement problems arising in aeronautical research. This may involve the application of electronics to the radio telemetering of test data from aircraft and piloted missiles to the ground, of radar techniques to tracking, and of servo-system techniques to the control of these aircraft and missiles. It may involve the application of optics, mechanics, or electrical measurements to the development of instrumentation for flight, wind-tunnel, or laboratory measurements, or to more specialized research problems such as are involved in high altitude soundings or in aerodynamic studies at supersonic speeds.

(F) Appointees will be concerned with the synthesis or suitability of special fuels for various types of heat engines, the isolation and study of combustion parameters, and the investigation of the kinetics of combustion.

(G) Appointees will conduct flight research, utilizing piloted aircraft, such as guided missiles, to determine aerodynamic properties of aircraft and aircraft components in the supersonic and transonic speed range.

(H) Appointees will serve as Engineer Test Pilots in the conduct of flight research. Duties will include preliminary analysis of the research problem or problems; design or setting up of the project; piloting of aircraft with special research instrumentation or equipment; and analysis of scientific and engineering data.

REQUIREMENTS

Basic Education Requirement: - Applicants must have successfully completed a standard professional curriculum leading to a bachelor's degree in a college or university of recognized standing with major study in an appropriate field of engineering, physical science, mathematics, or other field of science closely related to the duties of positions included in this examination.

For P-2, S3297: - In addition to the basic education requirement, applicants must have had at least one year of professional scientific or engineering experience that has positively demonstrated the applicant's ability to do one or more types of research described on page one of this announcement. Research done prior to graduation over and above the basic requirements for the bachelor's degree, under a scholarship or fellowship or as a part-time outside work, may be considered as qualifying experience under the provisions of the section, below, headed Part-Time or Unpaid Experience.

For P-3, S4199: - In addition to the basic education requirement, applicants must have had at least two years of progressive professional scientific or engineering experience, including at least one year of research equivalent in level of difficulty and responsibility to the duties of P-2 positions, that has positively demonstrated the applicant's ability to do one or more types of research described on page one of this announcement.

For P-4, S4927, through P-6, S9729: - In addition to the basic education requirement, applicants must have had at least three years of progressive scientific or engineering experience, including at least two years in research, one year of which must have been research performance or direction equivalent in level of difficulty and responsibility to the duties of positions in the next lower grade, that has positively demonstrated the applicant's ability to do one or more types of research described on page one of this announcement, or to organize, direct, and coordinate research of these types.

Substitution of Graduate Study for Experience: - Successful completion of graduate study fully equivalent to the requirements for a master's degree including research, in an appropriate field of engineering, physical science, or mathematics may be accepted as meeting the full requirements for P-2 positions. In case undergraduate study was not in an appropriate field, possession of the master's degree in an appropriate field must be shown. For grades above P-2, it may be substituted for the requirements through one year of the required general professional experience. To qualify for P-3, applicants who have the master's degree or its equivalent must show one full year of research over and above the requirements for the master's degree.

Successful completion of graduate study fully equivalent to the requirements for a doctor's degree, including the thesis, in an appropriate field of engineering, physical science, or mathematics may be accepted as meeting the full requirements for P-3 positions. In case undergraduate study was not in an appropriate field, possession of the doctor's degree in an appropriate field must be shown. For grades above P-3, it may be substituted for the requirements through the one year of required general professional experience and one year of the required research experience. To qualify for P-4, applicants who have the doctor's degree or its equivalent must show one full year of research over and above the requirements for the doctor's degree.
Additional Credit for Creative Research: Applicants who have achieved the distinction of making a creative research contribution to the field may be eligible for a higher grade than the grade for which they would otherwise be eligible. Such research contributions may be in the form of written papers, articles, or reports dedicated to aerodynamics. It must have been original research, in that it must have produced a basic principle, concept, method, approach, or technique that not only solves the specific research problem at hand, but also is directly applicable in the solution of other research problems, and may even open a new area of research. On the other hand, such research characteristically involves the introduction of unorthodox assumptions, approaches, physical concepts, mathematical developments, or relationships which are not obvious but correct, and which have not previously been made even by authorities in the field. On the other hand, it may also characterize the rejection of assumptions, idealizations, approaches, physical concepts, mathematical techniques, or relationships hitherto held valid but which, for obscure reasons, do not hold when applied to the problem.

College Teaching in an appropriate field of engineering, physical science, or mathematics with the rank of instructor or above will be considered qualifying for required general professional experience. Research accompanying college teaching, when done on a part-time or intermittent basis, must total an aggregate one year to qualify for P-5.

Part-Time or Unpaid Experience: Credit will be given for all valuable experience of the type required, regardless of whether compensation was received or whether the experience was gained on a part-time or full-time basis. Part-time or unpaid experience will be credited on the basis of time actually spent in appropriate activities. Applicants wishing to receive credit for such experience must indicate clearly the nature of their duties and responsibilities in each activity and the number of hours a week spent in each.

For positions in any grade, the required amount of education and experience will not, in itself, be accepted as proof of qualification for a position. The applicant's record of education and experience must be of an acceptable type and level and must show that he has the ability to perform completely the duties of the position.

Physical Requirements: A disability of arm, hand, leg, or foot is acceptable if such disability does not prevent satisfactory performance of the duties. Some of the positions will include work in compressed air environments or be performed under simulated or actual high altitude conditions; some will involve the piloting of aircraft with special research equipment. Applicants must possess sufficient good vision, with or without glasses, and be able to hear the conversational voice, with or without a hearing aid, to perform the duties described in this announcement. Subsequently good near vision for reading calibration on research instruments, corrected or uncorrected, is required when an essential part of the duties. Any physical defect which would cause the applicant to be a hazard to himself, to others, or to operating equipment, or which would prevent efficient performance of the duties of the position, will disqualify him for appointment. A physical examination will be made by a Federal medical officer before appointment. Persons who are offered appointment must pay their own expenses in reporting for duty. If appointed at the place of assignment, they are found ineligible because of physical defects, they cannot be appointed and no part of their expenses in returning home can be borne by the government.

Citizenship: Applicants must be citizens of or owe allegiance to the United States, or must be citizens of the Republic of the Philippines.

Age: Applicants must have reached their 18th birthday but must not have passed their 52nd birthday at the time of filing application. These age limits do not apply to persons entitled to veteran preference. These age limits will be waived for war service indefinite employees who, on the date of filing application, are serving in positions which would be filled from the eligible registers resulting from this examination. The names of such employees, if otherwise eligible, will be entered on supplemental lists which will be used only after all eligible veterans meet all required qualifications have been given appropriate consideration. An eligible on this list may be accorded a classified status only in the position he holds on the date of filing application or one of lower grade for which the list is appropriate.

Basis of Rating:

For Positions in Grades P-2, P-3, P-4, and P-5: No written test is required. Applicants' qualifications will be rated on a scale of 100 (see paragraph on veteran preference) and will be determined by professional evaluation of qualifying experience, education, and training and on further corroborative and supplementary information which may be obtained. Confidential confidential reports, contacts with the applicant's superiors or associates, may be made concerning his research ability and experience record. Registers, or lists of eligibles, will be established as a result of examination of all applications received through May 1, 1947. Applications received after that date will be rated as received, evaluated on the same competitive terms, and placed in the appropriate competitive position of the register for which they qualify. Separate registers will be established at each grade level for various line of branches, and may be further divided according to the various needs of the service. Selection will be made for each position from those with the highest ratings on the appropriate list. Each competitor will be rated at the highest salary level for which he is qualified, as well as for all lower levels, the salaries of which he is willing to accept.

For Positions in Grades P-6, P-7, and P-8: No written test is required. Applications will be handled as received. A preliminary review will be made of the training and experience of each applicant as described in his application form. All applications will be acknowledged. Applicants who do not meet the prescribed requirements will be so notified, and their applications will be returned. Applications of those who, from the preliminary review, appear to meet the examination requirements will be retained. As vacancies occur, the qualifications of the latter will be evaluated in relation to specific positions to be filled. At such time, confidential inquiries, including contacts with the applicant's superiors or associates, may be made regarding his research ability and experience record, and supplementary information may be requested from the applicant. Selection for the specific position (or positions) at the appropriate salary grade will be made, based on a scale of 100 (see paragraph on veteran preference).

Salary and Work Week:

Salary is based on the standard Federal work-week of 40 hours. Additional compensation is provided for any authorized overtime worked in excess of the 40-hour week. The salary range for each grade of these positions is given below. For employees whose services meet prescribed standards of efficiency, the entrance salary is periodically increased by the amount shown in the table, until the maximum rate for the grade is reached.

<table>
<thead>
<tr>
<th>Grade of Position</th>
<th>Basic Salary</th>
<th>Periodic Increase</th>
<th>Maximum Salary</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-2</td>
<td>$3597.20</td>
<td>$125.40</td>
<td>$4192.60</td>
</tr>
<tr>
<td>P-3</td>
<td>$4925.00</td>
<td>$125.40</td>
<td>$5620.40</td>
</tr>
<tr>
<td>P-4</td>
<td>$4902.00</td>
<td>200.80</td>
<td>$6902.80</td>
</tr>
<tr>
<td>P-5</td>
<td>$5905.20</td>
<td>239.40</td>
<td>$6664.60</td>
</tr>
</tbody>
</table>

- 5 -
A Federal employee serving in a position in the competitive civil service, at a salary above the basic entrance salary for the position in which he is appointed or classified from this examination, may continue to be paid at his current salary rate if it is not beyond the maximum salary for the position in which he is so appointed or classified. All basic salaries are subject to a deduction of 5% for retirement purposes. Income from the government is subject to the same withholding tax for income tax purposes as income from other sources.


**Positions to be Filled:** Vacancies in these positions and positions requiring similar qualifications will be filled from these registers unless it is in the interest of the service to fill any position by reinstatement, transfer, or promotion.

**Certification:** Certification to fill vacancies in these positions will be made of the highest eligibles on the appropriate register who indicate a willingness to accept appointment at the station where the position is to be filled.

**Appointments:** Appointments for entry into the service in these positions will be made subject to investigation and will be probational unless otherwise limited. Probational appointments become permanent upon satisfactory completion of a probationary period of one year. Appointment to an other than a temporary position from any register will remove the candidate from all other registers established under this examination announcement.

**No Fee Charged:** Appointments to Federal positions which are subject to the Civil Service rules are made through the Civil Service Commission. It is not necessary to secure the services of a private employment agency in order to obtain Federal employment.

**Sex:** The office requesting certification of eligibles has the right to specify the sex desired.

**Fingerprints:** Fingerprints will be taken of all persons appointed from this examination.

**Veteran Preference:** Preference benefits based upon honorable separation from the armed forces are given under certain conditions in competitive examination for original appointment:

1. Five points are added to the earned ratings of the applicant who establishes claim to preference based on his or her own active service in the armed forces of the United States during any war or in any creditable campaign or expedition.

2. Ten points are added to the earned ratings of applicants who establish a claim to preference as: (a) a disabled veteran; (b) the wife of a disabled veteran who is disqualified for appointment because of his service-connected disability; or (c) the widow (who has not remarried) of a deceased ex-service man who served in the armed forces of the United States on active duty during any war or in any creditable campaign or expedition.

Veterans claiming 6-point preference based on wartime military service are not required to furnish proof of honorable separation until the time of appointment. All other preference applicants should file Form 14, together with the documentary proof specified therein, at the time of filing application Form 57.

**HOW TO APPLY**

**What to File:** To apply for this examination, file the material listed below:

1. Civil Service Standard Form 57, "Application for Federal Employment." Be sure to show the title of the examination, the lowest salary you are willing to accept, and the acceptable locations for employment. Note that references are required; these should be selected primarily on the basis of a thorough knowledge of your ability.

2. C.S.C. Form 14, "Veteran Preference Claim," with the documentary proof required therein, if you are claiming veteran preference and if the form is required in your case (see last paragraph on veteran preference, above).

3. C.S.C. Application Card Form 5001-ABC.

4. A copy or photostat of your college transcript, or a complete list of courses, including all undergraduate and postgraduate courses, showing the semester hours credit for each course, the grades received, and the approximate dates of completion. (This information is generally available for present NACA employees and should not be furnished by such employees unless specifically requested.)

5. A list of all publications, writings, and reports related to the field, of which you are the author or co-author, and, if possible, a reprint or copy of each. Materials submitted will be returned if the applicant so requests.

6. A brief but clear description of any unpublished scientific or engineering research, inventions, or projects undertaken or participated in by you.

**Where to Get Forms:** The forms listed above may be obtained from any first or second class post office, except in regional headquarters cities, where the forms must be obtained from the United States Civil Service regional offices (see list below). Forms may also be obtained from the United States Civil Service Commission, Washington 25, D. C., or any of the NACA Boards of U.S. Civil Service Examiners receiving applications.

**Where to File:** Applications should be filed with the Board of U.S. Civil Service Examiners at the nearest station in which the applicant wishes to be considered. Only one application is necessary; you will be considered for all locations, including Washington, D. C., specified in the application. Following are the three mailing addresses:

- Board of U. S. Civil Service Examiners
  Nat'l Advisory Committee for Aeronautics
  Langley Memorial Aeronautical Laboratory
  Hampton, Virginia

- Board of U. S. Civil Service Examiners
  Nat'l Advisory Committee for Aeronautics
  Aircraft Engine Research Laboratory
  Cleveland, Ohio

- Board of U. S. Civil Service Examiners
  Nat'l Advisory Committee for Aeronautics
  Ames Aeronautical Laboratory
  Moffett Field, California

**UNITED STATES CIVIL SERVICE REGIONAL OFFICES**

- **FIRST REGION:** Post Office and Courthouse Bldgs,
  Boston 4, Massachusetts
- **SECOND REGION:** Federal Bldg,
  Chicago 2, Illinois
- **THIRD REGION:** Federal Bldg,
  Philadelphia 5, Pennsylvania
- **FOURTH REGION:** 120 Post Office Bldg,
  St. Louis 1, Missouri
- **FIFTH REGION:** 120 New Post Office Bldg,
  Atlanta 7, Georgia
- **SIXTH REGION:** 120 Post Office Bldg,
  Cincinnati 1, Ohio
- **SEVENTH REGION:** 120 Post Office Bldg,
  Chicago 7, Illinois
- **EIGHTH REGION:** 120 Post Office and Courthouse Bldgs,
  St. Louis 1, Missouri
- **NINTH REGION:** 120 New Post Office Bldg,
  St. Louis 1, Missouri
- **TENTH REGION:** 120 Post Office Bldg,
  New Orleans 16, La.
- **ELEVENTH REGION:** 120 Post Office Bldg,
  3rd Ave., Seattle 4, Washington
- **TWELFTH REGION:** 120 New Post Office Bldg,
  San Francisco 3, Calif.
- **THIRTEENTH REGION:** 120 New Post Office Bldg,
  Denver 2, Colorado
- **FOURTEENTH REGION:** 301 South Harwood St.,
  Dallas 1, Texas