

Reproduced by

CENTRAL AIR DOCUMENTS OFFICE

WRIGHT-PATTERSON AIR FORCE BASE - DAYTON OHIO

PROPERTY OF AIR FORCE LIBRARY

5061

112862

When Government or other drawings, specifications or
are used for any purpose other than in connection with
related Government procurement operation, the U.S.
thereby incurs no responsibility, nor any obligation
and the fact that the Government may have formulated,
in any way supplied the said drawings, specifications
is not to be regarded by implication or otherwise as
licensing the holder or any other person or corpora-
tion any rights or permission to manufacture, use or
sell invention that may in any way be related thereto."

~~RESTRICTED~~

RESTRICTED

PHUD FILE COPY

**RESEARCH AND DEVELOPMENT
IN THE
UNITED STATES AIR FORCE**

Report of a Special Committee
of the
Scientific Advisory Board to the Chief of Staff, USAF

RESTRICTED

21 September 1949

General Hoyt S. Vandenberg
Chief of Staff, U. S. Air Force
Headquarters U. S. Air Force
Washington 25, D. C.

Dear General Vandenberg:

As a result of the statement which you directed to the Scientific Advisory Board at its April 1949 meeting, the Board appointed a special Committee to make an over-all study of USAF research and development activities. This Committee, whose membership is shown at the end of this letter, spent nearly two months in its investigations and discussions.

With this letter, I hand you the Committee's report. Its conclusions and recommendations have my full concurrence.

Your April 1949 statement to the Board goes to the heart of the problem of achieving effective technical progress in the USAF and stresses the importance of Air Force research and development as a vital factor in the national security. The Air Force is the arm which promises to play the major role in any war which we can now foresee. Unless that war takes place within a very few years, we must fight it not with the weapons we have today, but with the weapons which research and development can put into our hands tomorrow. In fact, our margin over our potential enemies lies predominantly in the technical superiority which we now enjoy, and must maintain. It would be very dangerous for us to suppose that we can remain secure by making technical progress at anything less than the maximum rate of advance we can achieve.

The prominent role of the Air Force in preserving the national security cannot be long maintained if the Air Force falls behind in its research and development. We are now witnessing a profound change in the nature of air weapons, as flight speeds enter the supersonic regime and the long-range guided missile moves ever nearer to practical and effective realization. All three Departments of the Department of Defense are taking a keen interest in this development, and are supporting it vigorously. Leadership in this work cannot be legislated or proclaimed; it must be earned. The Air Force can earn it only by achieving, through research and development, technical and operational superiority in these new fields.

Full realization of the implications of the present trends has come to the Air Force at a time when it has been facing other major problems of extraordinary difficulty. The Air Force is only some two years old as an independent Department, and it has had to deal with numerous problems

of internal organization arising from its independence. The principles of Service unification have had to be worked out and adequate national support assured for the Air Force's primary mission of long-range strategic bombardment. Most immediately important, the Air Force has had to create, from the disordered fragments left by demobilization, an effective force-in-being capable of meeting the grave responsibilities of airpower in the support of national policy.

It is understandable that the Air Force, faced with such problems, should have given lower priority to its research and development activities. The Committee believes that this has been necessary in the past, but now that the immediate problems appear to be in hand, the Committee submits that the same competence, imagination, and vigor which have characterized Air Force operations must be brought to bear on USAF research and development matters. A really high priority must be given to the problems of creating an adequate organization and providing effective support for research and development.

The Committee found that the existing organization, personnel policies, and budgetary practices do not allow the Air Force to secure the full and effective use of the scientific and technical resources of the nation. Neither do they allow the use of Air Force civilian and military technical personnel to full advantage, nor do they permit deriving the benefit that the Air Force should derive from its relationships with the industries and the universities of the country.

The Committee was well impressed with the highly commendable and determined efforts on the part of some competent individuals in research and development to correct this potentially disastrous situation. However, only USAF-wide understanding of the serious nature of these problems and concerted action on the part of the entire organization can ever rescue Air Force research and development from the progressive deterioration it is now undergoing. This is readily apparent from the conclusions of the Committee which are presented in detail in the attached report. These conclusions tend to support the recommendations which have been made by various advisors to the Air Force over the last four or five years. Some of the more important points can be summarized as follows:

1. While the top command of the Air Force has on frequent occasions emphasized the crucial importance of technical progress, an understanding of the policies and organization necessary for making such progress has not yet been sufficiently diffused throughout the Air Force, nor have adequate steps been taken to implement the necessary policies and provide a suitable organization.

2. Fundamental research and initial development are now handled by a number of Commands and by several staff agencies, all of which are simultaneously responsible for different and quantitatively far greater jobs. The division of duties and responsibilities between the various Commands and the staff agencies is not sufficiently clear. Research and initial development have suffered because of the present situation.
3. Satisfactory progress in Air Force research and development can be made only when a single agency, headed and staffed by technically qualified personnel, is charged with this single purpose and is given the entire job. Such an agency should be directed to prepare and defend its own budget and personnel requirements, formulate personnel and administrative policies, and plan its facilities—all, of course, within the broad framework of over-all Air Force plans, objectives, and allocations.
4. At present, funds used to support research and development work are drawn from many different budgetary sources, most of which are quite outside the control of those responsible for research and development. This practice should be revised to provide for the unified budgeting of all costs, including house-keeping and indirect costs, involved in research and development, and for the control of this budget by the single agency mentioned above. While this change would result in an apparent increase in the costs of research and development, it would lead, in fact, to a balanced and more effective program, and would produce greater efficiency and actual savings.
5. The Air Force presently has far too few officers with technical qualifications, despite the highly technical nature of the Air Force mission. Even the present inadequate number of technically qualified officers are not used now in the most effective way. Both of these difficulties can be traced to the belief, general among officers, that career advancement cannot be secured by excellence in technical work, that there is no sound Air Force policy to utilize highly-trained officers in technical jobs, and that opportunities for promotion in and for technical work are far from equal to those offered in other Air Force duty. It is my belief that a proper and unified organization of research and development, as suggested in item 3, will provide automatically a number of important and responsible positions which appropriately can be filled only by technically qualified, high-ranking

RESTRICTED

officers. Proper organizational measures and a definite reform in personnel policy must go hand in hand, and only both together can secure the expected results.

There are also far too few competent civilian technical employees in the Air Force. Those now available are often working under the direct supervision of officers who have insufficient technical qualifications to direct their activities properly. Under no circumstances should a highly technical job carrying responsibility and authority be filled by anyone except a fully qualified technical man. Actually, in the great majority of technical jobs, it is far more important that the incumbent be technically and administratively competent than that he be an officer.

6. Air Force field facilities for research and development are ill-equipped for the jobs they have to do. Much additional capital investment must be made in permanent facilities, particularly at remote stations, even to accomplish the minimum job for which each location is uniquely fitted. The Air Force urgently needs new facilities to meet the challenge of the coming era of supersonic flight. The construction of new facilities should be initiated as part of an over-all Department of Defense plan which re-evaluates the existing facilities and insures adequate and continuing support to those which are found essential, but does not cause waste of money and personnel by arbitrarily prolonging the life of obsolete equipment.
7. The Air Force should make fuller use of the technical talent and facilities possessed by the industries and the universities of the country. A small recurring investment in the support of fundamental scientific investigations would secure for the Air Force the enthusiastic interest of the foremost scientists of the country; such men are today being substantially assisted mainly by the Office of Naval Research and by the Atomic Energy Commission. The Air Force is clearly faced by problems requiring fundamental scientific investigations; the best results in such work can be secured by direct contact between an Office of Air Research and scientists.

Further, Air Force contracts with industry frequently are restricted to the development of one component of a complicated system, based mostly on the results of operational staff studies. However brilliant such staff studies may be from the operational standpoint, they will probably fail to take full account of the intricate technical possibilities which largely guide the evolu-

RESTRICTED

tion of military requirements. They should therefore be supplemented by enlisting the aid of industrial concerns and research institutions in the work of establishing the optimum characteristics of the entire weapon system, thus properly balancing operational requirements and technical possibilities. The best component design would then develop organically from such a procedure.

Finally, the Air Force should most seriously consider and undertake the operation of facilities required for research and development work by industrial contractors and non-profit organizations.

8. In Air Force Regulation 80-4, there has already been set forth an official policy consistent with most of the changes recommended above, so far as research is concerned. Immediate steps should be taken to implement AFR 80-3, and a similar regulation stating Air Force policies concerning development should be issued and implemented.

It has not been possible in this short letter to do more than mention the principal findings of the special Committee. I hope that you will be able to look over the detailed report, which documents and extends the points above. You will observe that only general answers are offered to two of your questions: first, regarding a master plan for facilities development; and second, regarding a method for insuring the most effective interaction between technical development, on the one hand, and plans and operations, on the other. The preparation of a long-range facilities plan requires more time than was available to the special Committee. However, the Scientific Advisory Board has set up a Facilities Committee which is studying this problem and will assist in the formulation of a functional plan to integrate existing and future facilities. The Committee believes that the answer to the second question will quickly evolve if USAF research and development activities are brought together and endowed with responsibilities and prestige, so that the man in charge of research and development is given a direct voice in the important top-level deliberations of the Air Force. One important aspect of this problem is the preparation of a report which gives estimates of the time-phasing of research and development objectives and their introduction into operational use. This can be accomplished only by a cooperative effort between operational and scientific planners. The Scientific Advisory Board could be of assistance in such work.

One important fact must be kept in mind. Research and development activities cannot be brought to full effectiveness without making corresponding sacrifices elsewhere in the Air Force. A decision to correct some

RESTRICTED

of the deficiencies in the present research and development situation will be valueless unless it is implemented in terms of competent men, money, and effort, and such men, money, and effort must come from a fixed, possibly even a declining, total Air Force allocation. It is my feeling, and that of the Committee, that the effectiveness of research and development is so uniquely important to the continued supremacy of the Air Force and the continued security of the nation that the necessary sacrifices must be made. Steps should be taken to insure that the process of successive cuts and economy measures within the Air Force do not form a growing avalanche which hits research and development with its maximum impulse, destroying essential agencies and projects of this vital part of the Air Force organization. If you are persuaded of this, please consider the attached report as an attempt to outline some of the steps which might be taken.

Respectfully yours,

Theodore von Karman
Chairman,
Scientific Advisory Board

The Committee:

George P. Baker
James H. Doolittle
James B. Fisk
Carl F. J. Overhage
Ralph A. Sawyer
Frank L. Wattendorf
John M. Wild
Raymond J. Woodrow
Louis N. Ridenour, Chairman

(UNPUBLISHED CAND)

RESTRICTED

ATI 112 862

(COPIES OBTAINABLE FROM CADO)

USAF, SCIENTIFIC ADVISORY BOARD, WASH., D.C.

RESEARCH AND DEVELOPMENT IN THE UNITED STATES AIR FORCE

RIDENOUR, LOUIS N. (CHAIRMAN) 21 SEPT '49 114PP
GRAPHS, CHART

RESEARCH, SCIENTIFIC
RESEARCH, INSTALLATIONS

RESEARCH FACILITIES (50)
GENERAL (0)

RESTRICTED

RESTRICTED

Table 1

TABLE OF CONTENTS

	Page No.
LETTER OF TRANSMITTAL	Letter I
TABLE OF CONTENTS	Table I
CONCLUSIONS AND RECOMMENDATIONS	Conclusions 1
I. THE ROLE OF THE PRESENT COMMITTEE	I-1
II. GENERAL REMARKS ON RESEARCH AND DEVELOPMENT	II-1
A. The Importance of Research and Development	II-1
B. What Are the Functions of Research and Development?	II-2
C. The Requirements for Effective Research and Development	II-5
III. PRESENT USAF RESEARCH AND DEVELOPMENT ORGANIZATION AND PROCEDURES	III-1
A. Present Organization for Research and Development	III-1
B. How is Air Force Research and Development Now Performed?	III-1
IV. GENERAL POLICIES FOR RESEARCH AND DEVELOPMENT	IV-1
A. Introduction	IV-1
B. Implementation of AFR 80-4	IV-1
C. A New Air Force Regulation Stating Policies for Development	IV-2
D. Continuity of Support for Research and Development	IV-2
V. THE ORGANIZATION OF RESEARCH AND DEVELOPMENT IN THE AIR FORCE	V-1
A. Introduction	V-1
B. Control by a Single Authority	V-1

	Page No.
C. A Command for Research and Development	V-2
D. The Headquarters Staff Agency	V-3
E. Separate Commands for Research and Development, and for Materiel or Logistics	V-5
F. The Scope of the Research and Development Command	V-6
G. The Office of Air Research	V-7
H. Evaluation and Requirements	V-8
I. Liaison with Production Activities	V-9
VI. THE BUDGET FOR RESEARCH AND DEVELOPMENT	VI-1
A. Consolidation of Fiscal and Personnel Data	VI-1
B. Preparation of Budgets	VI-3
C. "Uniform" Accounting	VI-4
D. Outline of an Accounting and Budget System	VI-6
E. The Total Size of the Budget for Research and Development	VI-8
VII. RESEARCH AND DEVELOPMENT PERSONNEL	VII-1
A. Introduction	VII-1
B. Increased Allotment of Technical Personnel	VII-3
C. Limited Resources of Qualified Officers Demand Better Utilization	VII-4
D. Career Possibilities and Recognition for Achievement in Technical Work	VII-6
E. Measures to Increase Technical Officer Strength	VII-7
F. Management of and Professional Opportunities for Civilian Technical Personnel	VII-9
G. Recruiting of Competent Civilian Personnel	VII-10
VIII. FACILITIES FOR RESEARCH AND DEVELOPMENT	VIII-1
A. Introduction	VIII-1
B. Long Range Planning of Facilities	VIII-1
C. Technical Requirements for Facilities	VIII-3