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BUREAU OF AIR COMMERCE

SAFETY AND PLANNING DIVISION

NOTE NO. 2

METHOD OF FUNCTIONING OF THE DIVISION

OCTOBER-1937

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INTRODUCTION

The aims and purposes of the Safety and Planning Division, the nature and scope of the problems which it proposes to handle and details of the organization are described in Note No. 1, Supplemental Justification for 1938-39 Budget Estimate. The means whereby the described objectives are to be accomplished are, however, only briefly touched upon in that Note. It is the purpose of this Note to describe in detail the contemplated method of functioning.

OBJECTIVES

The primary objective of the Division, stated as simply as possible, is to ascertain the needs of all branches of the aeronautical industry, including the Bureau of Air Commerce, as relating to increased safety and to undertake to have these needs satisfied by the best means available.

Other objectives of a secondary nature which may logically be later added relate to fostering air commerce by attempting to bring about increased general use of aircraft, increased movement of commerce by air and similar matters. At the present time, however, the Division is concentrating directly on safety.

The Division is founded on the following provisions of the Air Commerce Act of 1926, as amended:

"Section 2, Promotion of Air Commerce. It shall be the duty of the Secretary of Commerce to foster air commerce in accordance with the provisions of this Act, and for such purpose-

(c) To study the possibilities for the development of air commerce and the aeronautical industry and trade in the United States and to collect and disseminate information relative thereto and also as regards the existing state of the art.

(d) To advise with the Bureau of Standards and other agencies in the executive branch of the Government in carrying forward such research and development

work as tends to create improved air navigation facilities, aircraft, aircraft power plants and accessories. The Secretary of Commerce is authorized to transfer funds available for carrying out the purposes of this subdivision to any such agency for carrying forward such research and development work in cooperation with the Department of Commerce.

(f) To exchange with foreign governments through existing governmental channels information pertaining to civil air navigation.

STATEMENT OF GENERAL POLICIES

The general policies upon which all decisions as to the method of functioning will be based are as follows:

1. Each project conducted or financially supported by the Division must be directed toward a specific result which result is clearly needed in the interests of safety and which, if successfully reached, will be of immediate practical use to the industry.

2. The Division will regard and conduct itself as being primarily a coordinating agency in two directions, viz:

(a) Coordinating, studying and classifying information as to the safety needs of the industry and the Bureau of Air Commerce.

(b) Coordinating the efforts of and the information obtained from all research and development agencies, both Government and private, whenever these activities may be applied to the safety needs, and making such information available to the public.

3. The Division will supplement its coordinating activities with original studies or improvement or developmental work, whenever that seems necessary or advisable, in one of three ways or a combination of any of them, in the following order:

(a) Bringing the need for specific work to the attention of the Governmental agency responsible for such work, if such an agency exists, and urging that a suitable program

be arranged. If necessary in some cases funds will be transferred to assist in such work.

(b) Arranging a contract with a competent private commercial, educational or research agency for the accomplishment of the necessary work.

(c) If neither method (a) nor (b) can be applied to the particular problem, Division personnel will be assigned to it.

4. The Division will never knowingly duplicate the work of any other competent agency, either Governmental or private, and will not at any time assign its personnel to any work which is properly the function of another Government agency.

5. The Division will assist any other Governmental agency connected with aviation in every way possible and will likewise assist, whenever possible, the efforts of any private agency directed toward safety improvement in general.

DISCUSSION OF GENERAL POLICIES

From the foregoing statement of general policies which is, in reality, a statement of the duties of this Division, it can readily be seen that the work is directed to the practical application of research results and not in any sense to the conduct of original or fundamental research. It can also be seen that the Division acts as a service agency for the Bureau of Air Commerce and, upon request, for any other Governmental Bureau, in that it seeks to find the solution to any technical Bureau problem.

Specific methods of procedure as applied to particular illustrative cases are discussed in the following pages under the heading of the appropriate section of the Division.

AIRCRAFT SECTION

Inventions - The Department of Commerce receives unsolicited aircraft inventions and ideas by letter and verbally at the rate of approximately 10 per week. These disclosures recommend or strongly urge new or revised Air Commerce Regulations, request Federal funds for the development of an invention or request a service test of a new device. These matters are all referred to the Aircraft Section, the personnel of which attempt to determine the merits of each case and recommend or initiate suitable action. Such of these letters as relate to the design of the aircraft and in which the Bureau has no interest are referred to the NACA for direct reply. Those which appear to have merit and others of a more general nature as well as those relating to radio and instrument development are responded to directly by the Aircraft Section after consultation with the best available authorities on the specific subject.

Lightning - An illustration of the type of project which may require considerable time on the part of our own personnel lies in the lightning study which is now going forward. Many aircraft have been struck by lightning with but little damage in this country so far as we now know. Reports from Europe indicate, however, that two major air disasters may have been caused by lightning. It is evident in any event that a hazard exists. This matter has been the cause of fresh concern to aircraft manufacturers and operators recently as they can obtain distinct advantages by building fuel tanks integral with the wing structure. They hesitate to do this, however, until they know more about the possible effects of lightning on such structures and have appealed to the

Bureau of Air Commerce for help on the matter. We are accordingly collecting all available information and hope that careful study, supplemented by whatever laboratory tests are necessary and can be arranged for, will result in dependable design information, operating instructions and Air Commerce Regulations designed to minimize this hazard.

Airport Orientator - An example of a meritorious invention and also of the contract type of procedure lies in the Airport Orientator, described inNote I. In this case, the Bureau paid part of the cost of the design and manufacture of the instrument and is loaning it to an airline company for service testing, after which complete details concerning it will be released to the public.

Structural and Aerodynamic Design - Another type of work exists in this group; highly technical but very important. In this connection, the Aircraft Section will study the research results of the N. A. C. A., the National Bureau of Standards and other such research agencies with a view to giving them practical application in the shape of design rules and Air Commerce Regulations. The Aircraft Airworthiness Section of the Bureau is badly in need of such service in the interests of safe construction.

AIR PORT SECTION

Performance Measurement - One of the projects now going forward in the Airport Section illustrates the occasional need for starting development work a long way back from the immediate objective. The Airport Section was faced with the need for drafting airport rating regulations which necessarily include, among other things, the dimensions essential for safe operation of various types of aircraft. They could find no accurate take-off and landing performance data for modern aircraft, however, and no suitable portable equipment for measuring such performance accurately. They, therefore, sponsored the development of special camera equipment by a camera manufacturer and are now measuring performance under actual conditions, from which they can intelligently determine proper airport dimensions.

Technical Consultation - This Section also provides the expert technical assistance needed by Federal, State and Municipal Governments in connection with the planning and establishment of airports and seaplane terminals throughout the United States. In order to perform this duty, they maintain constant contact with all phases of airport design development.

AIR TRANSPORT SECTION

Pilot Studies - A further variation of the means used by the Division is evident in the group of pilot studies which are now going forward. The predominance of pilot error as a direct cause of recent accidents leads inevitably to one of two conclusions, viz:

(a) The specific pilot was not as competent as we thought him, or

(b) The complexities of modern flying are placing too great a strain upon pilot personnel.

It is probable that both of the foregoing are factors in the situation. In an effort to determine causes and remedies, the Division is proceeding as follows:

(a) A committee of five outstanding members of the Aeronautical Medical Association has been delegated to work with the Division and, specifically, the Air Transport Section, in whatever manner seems best.

(b) A prominent flight surgeon has been employed by the Air Transport Section to get appropriate work and study started.

(c) Contracts for research on specific angles of the matter will be negotiated with competent laboratories.

Traffic Control - In the matter of traffic control, the Air Transport Section will probably act entirely as a service agency for the Bureau. It is anticipated in this case that the Airways Operation Division will necessarily be so completely absorbed in th

immediate problems of instituting and operating airway traffic control that all long-range problems and studies will be referred to the Air Transport Section for study and the drafting of appropriate policies.

INTERNATIONAL SECTION

The personnel of the International Section will act as technical advisors to the Secretary of Commerce and to other Federal agencies in connection with international aviation treaties, trade agreements and navigation arrangements. They will also serve as a service agency for the Bureau in collecting information relative to foreign aeronautical developments and trends.

POWER PLANT SECTION

This Section is charged with the responsibility of minimizing fire and other hazards in power plant installations. Several projects suggest themselves in this connection, as follows:

Fuel Gauge - There exists at the present time no satisfactory aircraft fuel gauge and this lack has caused at least one serious accident to our knowledge. It is probable that the Power Plant Section will search for a likely design for such an instrument and arrange a contract for its production and test.

Cabin Heater - Present types of cabin heaters on small aircraft are such that there exists considerable possibility of dangerous carbon monoxide concentrations in the cabin. The probable method of attack on this problem is the same as for fuel gauges.

Vibration - The prevention or elimination of bad vibrations in power plant installations is an exceedingly complex problem toward the solution of which much research has been done. It seems time now for this Division to review that work to see if the knowledge already gained may not be applied to modern aircraft in a more satisfactory manner than now exists.

RADIO DEVELOPMENT SECTION

History - The past history of the Radio Development Section has provided an illustration of extreme ingenuity in finding a means to fulfill a pressing need. The development of specifications for the present excellent system of airway radio facilities with no precedent even approximating the equipment needed and with little or no assistance available from any other agency was a striking accomplishment requiring considerable design work on the part of Bureau personnel. It is well to point out, however, that this development was in no sense research work. It was rather the process of giving application to known research results, under somewhat more difficult circumstances than usual. It was also a proper Bureau function, there being no other way to meet an urgent necessity.

Present and Future - Since commercial radio organizations are now much more interested in aeronautical radio than they have been heretofore, it is anticipated that the Radio Development Section can function in the future in much the same manner as the other sections which are faced with the need for providing a specific piece of equipment. That is, they will be able to arrange contracts with radio laboratories for the design and manufacture of a device to meet specified performance criteria and devote more of their energy to service testing of the resultant equipment. It is anticipated, however, that it will frequently be necessary to conduct a certain amount of original preliminary testing with make-shift equipment in order to first reach a tentative conclusion as to whether the desired performance

criteria are obtainable by the method contemplated. This latter point is indicative of the fact that the Bureau leads the world in airway radio development and is a necessary adjunct thereto.

Ultra-high Frequency Radio Ranges - This project is illustrative of what might be termed normal radio development procedure.

The problem presented to the Radio Development Section was the elimination or minimization of the following disadvantageous features of the present radio ranges:

(a) Interference between different stations because of the crowded condition of the allotted frequency band.

(b) Bends, multiple courses, swinging and fade-out spots on the present ranges.

(c) Poor penetration through bad atmospheric disturbances.

The procedure being followed to solve this problem is as follows:

(a) A radio transmitter was converted to ultra-high frequencies and connected to an antenna erected on a wooden pole.

(b) A receiver adapted to ultra-high frequencies was installed in a Bureau airplane and extensive flight tests are being made on the trial range.

(c) If the flight tests continue to show promise, specifications will be written and manufacturers will be invited to bid on about three complete transmitting sets.

(d) These sets, when erected at different localities, will be further flight tested.

(e) If the tests in (d) are successful, the specifications, revised where necessary, will be turned over to the Airways Engineering Division with a recommendation that they equip a complete airway with the new ranges.

CONCLUSION

In conclusion it may be well to further clarify the relation between the Division and research laboratories of all kinds, as follows. The Division seeks only to apply to the needs of aviation the results available from research agencies wherever found and wherever applicable, thereby bridging a gap which would otherwise grow more menacing to safety as aviation progressed; and to instigate research in such research agencies when adequate fundamental knowledge is not available for application to a specific safety need.