Air Traffic Control Project
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SUBJECT: BI-WEEKLY REPORT, June 24, 1949

1.0 GENERAL

(W. G. Welchman)

The Air Navigation Development Board was established in the fall of 1948 by the Secretaries of National Defense and Commerce, jointly, and charged with the responsibility of the formulation and direction of a unified program for research and development of aids for a common national system of air navigation and air traffic control, to serve the needs of civilian and non-tactical military aviation, but being capable of integration with any air defense system established by the Military Establishment.

The main purpose of the ANDB Symposium of June 16 that was attended by J. W. Forrester, C. R. Wieser and myself was to bring together representatives of the various organizations that are working on air traffic control. We heard brief accounts of work that has been done and the investigations that are now being undertaken and were able to make a number of contacts that will probably be useful later on.

C. R. Wieser and I have given some consideration to the preparation of diagrams representing the operations that have to be performed during the various stages of traffic control, trying to classify the different types of input information, stored information, and output information that may have to be handled. It is, of course, unlikely that any diagram that we may produce at this stage will be of much permanent value and our object is largely to find out what sort of things we should be investigating. Our first impressions were that the so-called "private line" is extremely important and that we should study the various possible methods of obtaining information about the position of aircraft.

It appears also that we must consider what exactly is meant by the planned position of an aircraft at a particular time. This ties up with the calculation of scheduled flight paths which is one of the tasks for which a computer is needed. I have begun an

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analysis of the type of overall system that seems to be implied by the ultimate objective of landing aircraft at the rate of two a minute. It seems likely that the ultimate system may depend very largely upon the methods that are adopted to put aircraft in sequence for landing as they arrive in the neighborhood of an air field. We discovered at the ANDB Symposium that a good deal of work has already been done on this problem, but not with a high-speed digital computer in mind. We shall start thinking about it in the near future. It seems clear from what we learnt at the ANDB Symposium that the present system of stacking will not be able to produce a sufficiently frequent output and that some system will have to be devised which can impose a controlled delay on an aircraft flying in an approach path. This indeed is the principle that was contemplated in the only investigation of the subject that I have so far read.

C. R. Wieser and I visited Alan Bemis and saw the radar installation that he uses in connection with experimental weather flights. We proposed to visit Boston airport next week.

(P. Franklin)

Worked out the determination of rectangular coordinates from the observed distances to three stations issued as M-2008.

(C. R. Wieser)

The ANDB Symposium on Air Traffic Control was attended on June 16, 1949. In the field of instrumentation, the need for improved communication with aircraft and improved en route navigation equipment was evident. Improvements in these fields may alter considerably the technique of handling the control problem since the present system places most of the burden of aircraft sequencing and guidance in the congested terminal areas where better navigation equipment now exists.

Some thought has been given to the nature of the information received from radar and the manner in which it might be fed to the computer. The principal difficulty seems to be the reception of too much information since all objects encountered by the beam will return echoes. It is necessary to determine which one of these signals is associated with the particular aircraft under observation at any given moment. The usual techniques of reducing the information by narrowing the beam and by range gating are unsatisfactory since the system must interrogate a large volume of space and in a short time. In addition, some means of identifying the aircraft is necessary.

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(C. R. Wieser) - continued

Some of these difficulties are eased by the use of a coded airborne transponder interrogated by ground radar. Here again technical difficulties are present since this system has poor angular accuracy and may require an excessive number of codes. The transponder seems to be better adapted to a navigation system which derives position from range data gathered from several ground stations.

(A. J. Perlis)

Have completed, with the assistance of Messrs. Israel and Rabinowitz, a tentative method for air surveillance by a radar net receiving no positional information from a/c other than echo readings. The construction of a flow diagram, preliminary to more detailed programming, is under way.

(D. R. Israel)

Since my arrival I have devoted the majority of my time to reading the reports of the Applications Study Group and on the work which has been done on the "private line". Have spent my time with P. Rabinowitz discussing his codes and ideas which have not been formally presented, and I am now in possession of much of this material in the form of rough codes, etc.

Have worked with Rabinowitz and Perlis on the problem of increasing altitude accuracy by multi-radar readings and on correlation of data from many radars. An overall flow diagram has already been completed and work is progressing on this subject.