

M E M O R A N D U M

June 7, 1941

Section D-2 recommends that a contract be entered into with the R. C. A. Manufacturing Company, Camden, New Jersey, in the amount of \$35,000, for completion by December 31, 1941. The purpose of this contract will be the investigation and development of electrical computing elements applicable to the design of fire control calculating instruments. The following are the specific objectives of this program.

1. Investigation of individual computing elements. An experimental and a theoretical study will be made of electrical computing devices suitable for performing the mathematical operations in a fire control predicting instrument. Addition, subtraction, multiplication, division, obtaining a function of two variables, and any other necessary operations will be included. Alternative methods will be examined.
2. Construction of experimental models of basic computing elements. Working models of the essential elements for performing the mathematical operations for fire control will be built. This does not imply the construction of a gun director.
3. A study to determine the most suitable form of director using the elements previously developed. Among the factors to be examined are: the coordinates to be employed, the characteristics of the computing element with respect to accuracy, range, speed, scale factor, etc., and the manner

in which these elements are coupled together.

4. A report will be prepared containing detailed descriptions of the elements developed and an analysis showing how these elements would best be applied to the design of a director to meet military requirements. A schematic diagram of the director and its components will be included. If alternate forms appear to be equally satisfactory, they will be discussed.
5. A proposal for making most effective use of the results of this investigation will be included in the final report.

In carrying out this contract, it is expected that extensive use will be made of electronic devices and associated equipment in which the personnel of the R. C. A. Manufacturing Company has had extensive experience. The work would be carried out in their electronic research laboratory, at Camden, New Jersey. Considerable progress has already been made in studying computing devices in which variables are represented by discreet impulses, by d-c voltages or currents, by a-c voltages or currents (amplitude only), and by use of the phase angle of an alternating voltage or current. Experimental units have been built to carry out the arithmetical operations of addition and multiplication and a unit has been started for the purpose of generating a function of two variables. A number of other proposals are ready for experimental design leading to laboratory tests.

At the present time, five engineers are available for assignment to this work plus whatever shop assistance is required. It is expected that by the end of August additional personnel will be available due to the completion of another contract and if this proposal is approved and in operation, Section D-2 will, prior to the end of August, consider the status of the project to

determine whether an extension should be recommended in order to expedite the work.

The official investigator to be named for this project is Dr. V. K. Zworykin, Electronic Research Laboratories, R. C. A. Manufacturing Company, Camden, New Jersey.