Proposed investigation of wing-pylon powered engine nacelle interference of Lockheed C-5A airplane

As a result of numerous conferences and telephone conversations, it has been agreed that the subject investigation will be made in the 8-foot transonic pressure tunnel starting on January 3, 1965. The research will be similar in nature to that conducted earlier this year with powered nacelles in combination with a representative C-5A wing. The new investigation will allow a further insight into the favorable interference measured during earlier investigations and will, coincidentally, provide the Lockheed Aircraft Company with design information for the airplane which they now have a contract to build. An official Air Force request for this investigation will be forthcoming. The present memorandum summarizes very briefly the events leading to the decision to make these tests.

The intriguing favorable interference measured during investigations earlier this year suggested the desirability of conducting further NASA sponsored investigations of this phenomena. Such an investigation was agreed to by the Chief of the Full-Scale Research Division. During a telephone conversation with Mr. John Hagerman of Wright-Patterson Air Force Base this proposed NASA investigation was mentioned, and he asked if the wing for the C-5A configuration finally selected could be used as a basic component for this investigation. The undersigned agreed that it could if the new wing were supplied by the airframe contractor. However, it was emphasized strongly to Mr. Hagerman that this was not to be a development test of the C-5A configuration but was to be a study of the nature of the favorable wing-nacelle-pylon interference. Also, it was pointed out that any new leads developed during this investigation would obviously be useful to the C-5A contractor in improving the performance of this configuration as well as providing the basic insights desired by NASA.

Mr. John T. Butrey, who was in charge of the General Electric contribution to the earlier powered-nacelle investigation, was also informed of the proposed new NASA investigation during a telephone conversation. He indicated a very strong desire that the General Electric Company participate in this new program in a manner similar to that in which they had participated in the earlier program. He asked if a new model General Electric engine being developed for the future investigations of the C-5A program could be utilized in this new NASA investigation. (At that particular point
in time it was fairly well established that the General Electric engine would be used on the C-5A although a contract had not been signed.) It was agreed that such an engine would be used if it could be developed in time for the new program.

The Lockheed Aircraft Company was informed of the proposed NASA investigation by Mr. Gutney of General Electric. They contacted the undersigned by telephone to ask if they could initiate the design and construction of a wing for such a program in anticipation of their winning the C-5A contract. It was agreed that they should; but it was emphasized that if they were not the winner, it was very likely that the wing would not be used in the proposed NASA program.

As the result of these several conversations, a meeting was held in the 3-Foot Tunnels Branch on August 24, 1945. Those attending were J. B. Cummings, H. S. Lesie, and W. H. Johnston of the Lockheed/Georgia Company, J. T. Gutney of General Electric Company, and J. G. Batterman, Jr., and the undersigned of Langley Research Center. Again at this meeting it was strongly emphasized the primary objective of the investigation was to provide an insight into the favorable interference. However, it was agreed that the base point for this investigation would be the complete Lockheed C-5A design if they were the selected contractor. The various factors involved with designing the Lockheed wing and pylon and nacelle arrangement and the General Electric engine for the proposed test were thoroughly discussed. On September 15, a second meeting pertaining to the proposed investigation was held at the 3-Foot Tunnels Branch. Except for the substitution of Mr. J. F. Cahill for Mr. W. H. Johnston, those present at this meeting were the same as at the prior meeting. The basic aerodynamic phenomena involved with the favorable interference were discussed in much more detail and the probable pylon designs to be utilized during the investigation were more fully defined.

On September 30, the Air Force announced that the Lockheed Aircraft Company had been selected to build the C-5A airplane. Following this announcement, the Chief of the Full-Scale Research Division agreed that the tentative agreements of the above mentioned meetings could be solidified into a firm commitment. The interested parties were so informed by telephone. A meeting of the interested parties, including the undersigned, will be held on October 19 at Wright-Batterman Air Force Base to accomplish, among other things, an official initiation of the phases of the program of interest to the Air Force. At this meeting the undersigned will again emphasize that while the results will be extremely useful to the contractors and to the Air Force, the primary objective of this investigation will be to study more fully the favorable wing-nacelle interference.
It has been agreed that Lockheed and General Electric will share the
cost of two of the models engines used in this program and the NASA
will buy two additional engines.

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