

**SECRET**

BM49-7-25

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Initial

Supersonic Fighter Configurations

1. During the evolution of the C-105 fighter, various evidence has accumulated to throw into doubt the capability of the aircraft's fulfilling the Requirements, in particular, the requirement for a combat performance of sustained turning at a load factor of two at  $M = 1.5$  at an altitude of 50,000 ft. This requirement is partly equivalent to specifying a ceiling well above 50,000 ft., the operational necessity for which the Chief of the Air Staff and the Chairman of the Defence Research Board have stressed strongly on June 29th in the instance of the CF-100. Some of the elements giving rise to a measure of alarm are as follows:-
  - a. The original N.A.E. assessment of the C-104 and C-105 proposals showed that failure to meet the above manoeuvring requirement was certain unless a substantial development was forthcoming in engines, in aerodynamic excellence, and in aircraft weight reduction. On the engine side, the PS-13 engine is a bold venture and, at present, a sanguine hope; but no aerodynamic improvement seems to have evolved which is of performance advantage. On the other hand, gradually sharpening awareness of the trimming drag of the tailless delta configuration has worsened further the initially inferior manoeuvring capabilities of the C-105 scheme.
  - b. During extended visits to A. V. Roe Canada Limited of Messrs. Wood and Michaelson at the request of the Chairman of the Defence Research Board it has appeared not only that the take-off weight of this project has risen to a figure of 59,608 lbs. for a supersonic mission of 200 n.m. radius, but that the book take-off weight of the aircraft has been increasing at a rate which, if continued, will result in a limitation of the J75 version of the aircraft to an absolute ceiling in the combat condition of 50,000 ft. in December 1956, i.e. five months before the first (J75) prototype is scheduled to fly. This weight trend, if associated with the PS-13 version of the aircraft, will limit that aircraft to a load factor of 1.3 at  $M = 1.5$  at 50,000 ft. at May 1957.
2. Apart from the controversial question of weight control, the question of aerodynamic configuration has become increasingly doubtful for the following reasons:-
  - a. The tailless delta configuration suffers a number of serious stability difficulties.
  - b. The internal stowage volume of the C-105 wing is considerably in excess of the fuel volume required for the Specification Mission, an unexploitable advantage which is paid for dearly by the excessive manoeuvring trimming drag of the configuration.
3. In the alarming situation outlined above, the following programme is to be put in hand forthwith:-
  - a. Flight Research Section
    - i. To reassess the combat turning requirement of the specification on the premise that an aircraft based on a new requirement at this juncture would come into service in 1965.
    - ii. To set out their best competitive configuration, based on L.F. = 2 at 50,000 ft. at  $M = 1.5$  and on a conventional representation of the fuselage, intakes, and canopy, as agreed with the Aerodynamics Section.



b. Aerodynamics Section

- i. To set out with the fuselage, intake and canopy conventions of 3 (a) (ii) above, a wind tunnel model of the C-105 aircraft.
- ii. To set out their best competitive configuration, on the same basis as 3 (a) (ii).
- iii. To act as the coordinating body for all performance methods and preparations for wind tunnel tests as agreed. The layouts under 3 (a) (ii), 3 (b) (i) and 3 (b) (ii) are to be compared under the conditions of the C-105 specification and under the modified conditions evolved under 3 (a) (i).

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