C-105 DIVE BRAKE PERFORMANCE

J.A. Chamberlin January 17, 1955.

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Report no.: QCX-AVRO-CF105- Misc.-6

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by (Name): Michel W. Drapeau

(Dept.): A/DND Coordinator, Access to Information

Date: Dec. 7, 1992

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Classification cancelled / changed to: UNCLASSSIFIED
By authority of: DRDA 7/DARFT 5-8/DAS Eng 6-4-5
Date: 5 Nov 1992
Signature: B Aubrey
Unit / Rank / Appointment: DSTS 3, Secretary CRAD HQ DRP

January 17, 1955.

05 DIVE BRAKE PERFORMANCE

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does not offer any space for brakes. However, if
pace, it would be very difficult to design brakes
in the wing that did not interfere with the elevators or ailerons. To overcome this difficulty, it would be necessary to use very large gaps between the brakes and the wing, which in turn would require a mechanically complex device which would be expecially difficult to stow.

Even locations on the fuselage sides or top do not appear favourable when elevator and rudder interference is considered. Accordingly, the under-fuselage location was only chosen after all other positions had been eliminated.

Size of Brakes

The brakes on the under surface of the fuselage have an area of 14 sq. ft. This compares with a profile drag area of 11 sq. ft. for the whole aircraft at subsonic speeds. It is thus evident that their drag is substantial relative to the clean aircraft.

In the approach and landing configuration, the L/D is quite low due to the high span loading and poor induced drag efficiency. This reduces the need for high drag flaps, so that it is felt that those provided will be more than adequate. This point has been verified by experience with the Avro 707 aircraft and the F102 which lands without brakes because the lower brake would foul the ground.

Trim Changes

The change of trim with brake open is shown in Fig. 1. There is virtually no change at subsonic speeds, while the elevator angle to trim rapidly becomes excessive at speeds in excess of M = 1. For this reason, the use of brakes at supersonic speeds is prohibited. A study of the tactical situation at supersonic speeds has failed to reveal any need for brakes on a missile carrying aircraft.

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C-105 DIVE BRAKE PERFORMANCE

Summary

Dive brakes with an area of 14 sq. ft. are provided near the middle of the under-surface of the fuselage of the C-105. These give no change of trim at subsonic speeds. However, their use is not permitted at supersonic speeds due to a change of trim that rapidly becomes prohibitive at speeds in excess of the velocity of sound.

Introduction

The provision of effecting dive brakes always presents a difficult problem. This has received extensive study in the case of the C-105 and it was concluded that the only possible location for brakes was on the under-surface of the fuselage.

Location

The reason for this decision lies in the fact that the wing is very thin and is filled with fuel tanks, undercarriage and control surface operating mechanisms. Even the fin does not offer any space for brakes. However, if it were possible to find space, it would be very difficult to design brakes in the wing that did not interfere with the elevators or ailerons. To overcome this difficulty, it would be necessary to use very large gaps between the brakes and the wing, which in turn would require a mechanically complex device which would be expecially difficult to stow.

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Deceleration

The decelerations available at both subsonic and supersonic speeds are shown on Fig. 2. These decelerations are caused by a combination of brake extension when permissible and reducing the engine r.p.m. simultaneously. It is felt that the decelerations shown will prove adequate for the mission of this aircraft.

C105.

C.A.L. WIND TUNNEL TESTS.

EFFECT OF SPEED BRAKES.

TRIM CHANGE WITH BRAKES DEFLECTED 60°

C.G. = .31 $\bar{c}$

W = 47000 LB

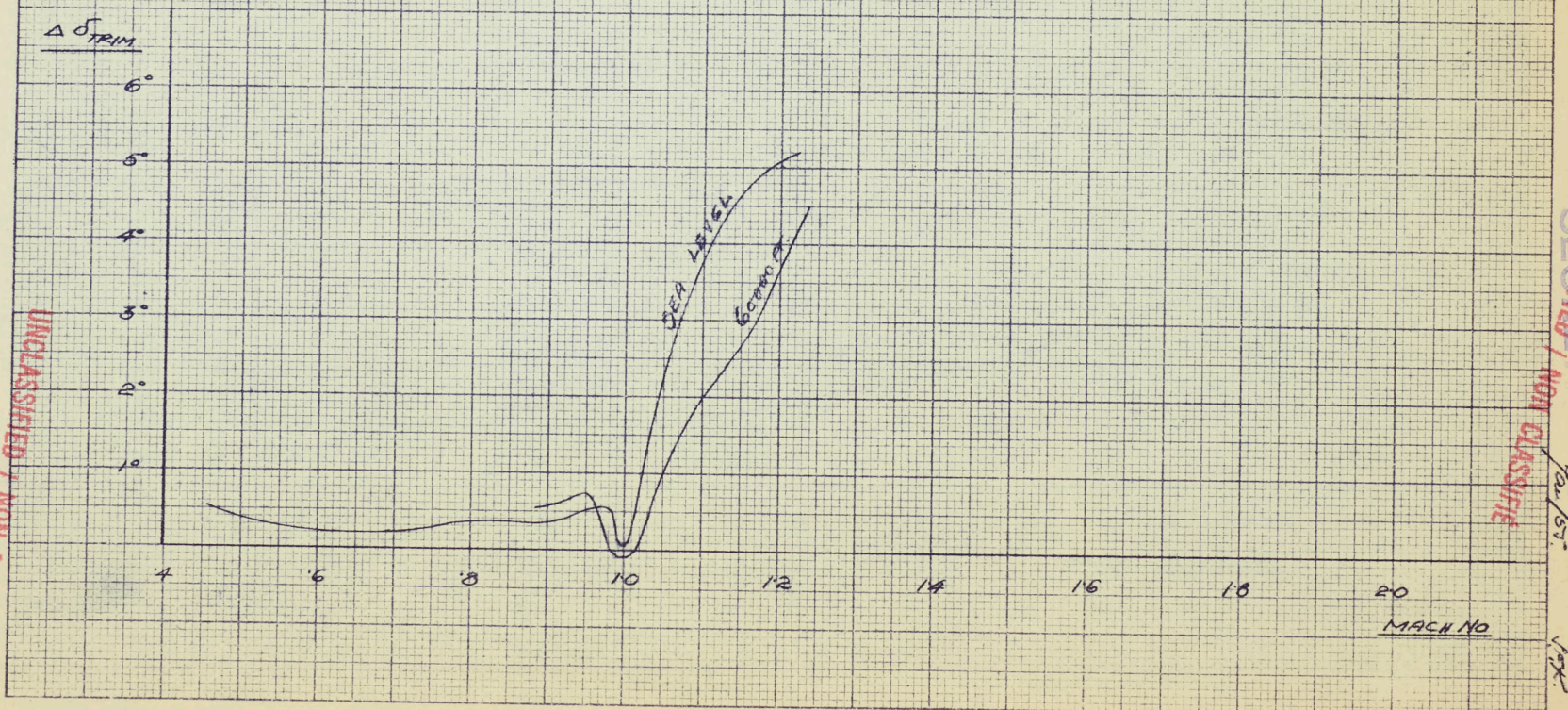

FIG. 1

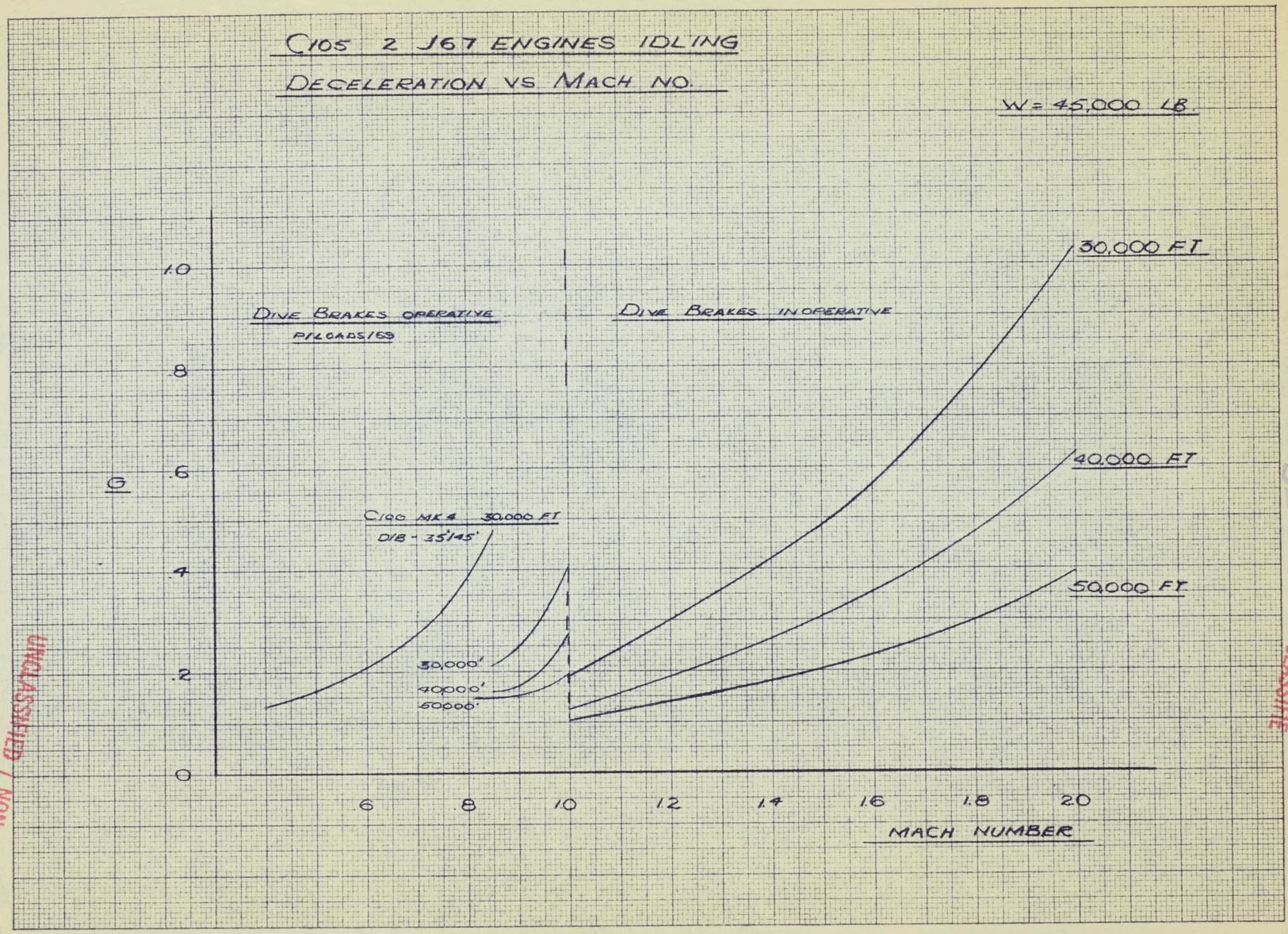

FIG. 2 PIPER P/169