

28 APR 1942
AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT.

BOSCOMBE DOWN.

UNCLASSIFIED

Mosquito (F) Mk. II. W-4070.
(2 Merlin 21's).

Level speed measurements made with matt and smooth black finishes

A.&A.E.E.ref:- 4487/44-A.M.61/8.
M.A.P. ref:- R.A.4111/R.D.E.I.(c).

DATE 18/12/52

STOCK

10

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Progress of Issue DATE Report.

This report deals with the air craft (or equipment) as tested. Action to remedy defects or decisions to accept items not in strict compliance with the specification are matters for decision and action by the M.A.P.

Report	Title.
3rd Part of A.A.E.E/767, a.	W.4052 - Brief performance and handling trials.
4th " " "	W.4052 - Calibration of fitted air thermometer.
5th " " "	W.4052 - Flame Damping.
6th " " "	W.4052 - Longitudinal stability tests for two different sizes of tail plane.
7th " " "	W.4076 - Handling and stability tests with the C.G. 6.3 inches aft of the datum point.

SUMMARY.

Tests made by Messrs. De Havillands had shown that the top speed of the Mosquito was reduced by 26 m.p.h. when painted with matt black finish, compared with that obtained with a smooth black finish. Similar tests have been made at this Establishment, and the results are given in this report. These show a reduction in speed of only 8 m.p.h. due to the matt black finish.

Introduction.

Tests made by Messrs. De Havilland on Mosquito F.Mk. II. W-4082 have shown that it was 26 m.p.h. slower when painted with matt night fighter black finish (R.D.M./2A) compared with speeds obtained on the same aeroplane, with a smooth black undercoat (D.T.D.308). We were required to make similar tests on W.4076 to determine if a similar decrease was obtained.

Scope of Tests.

On arrival at this Establishment, the aeroplane was finished with the matt black finish. Level speed measurements were made at heights between 18,000 and 25,000 ft. in F.S.supercharger gear. As it was likely that the position error correction of the static vent on the starboard side of the fuselage would be affected by the surface finish, an A.S.I. was fitted between the pressure and static sides of the Mark VIII pressure head on the fin, and all speeds measured on this instrument. The position error correction for this position was measured.

The aeroplane was then returned to Messrs. De Havillands for the matt black surface to be removed, and for the smooth black finish to be applied. Level speed measurements were repeated under the same conditions as above and the position error correction again checked with this surface finish. Whilst at Messrs. De Havillands, it was found necessary to replace some of the panels of the engine cowlings and also the flame damping exhausts, but as far as could be determined by a close examination of the aeroplane, no difference in the external shape of these could be noticed.

The tests were made during the period 7th March, to 2nd April, 1942.

/cont:

Condition of aeroplane relevant to tests made.

This aeroplane is a production F. Mk. II Mosquito. It had the fighter type windscreen, with a windscreen wiper fitted externally. The engine nacelles extended beyond the trailing edges of the wing and the tailplane was of 20' 9" span. Four 20 m.m. guns were fitted in tunnels under the nose. Neither the tunnels nor the muzzles were sealed for these tests. Four .303" guns protruded from the nose and these were also unsealed. The flame damping exhausts were twin ejectors with fishtails, covered with unlouvered ducts. These ducts had a row of small holes along the base. Neither ice guards nor air cleaners were fitted to the air intakes. Landing lamps were fitted under each wing.

"A.I." aeriels were fitted above and below each wing tip and in the centre of the starboard wing only. There were no A.I. fittings on the nose. The W/T aerial mast was fitted on top of the fuselage, but no aerial. There were no I.F.F. aeriels fitted.

For the tests with matt black finish, the aeroplane was painted matt black throughout, excepting for the spinners and the top panel over the .303 guns which had a smooth black finish.

Loading. The tests were made at a weight of 18,530 lb.

Results of tests.

The level speed results obtained are given in Tables I and II and in Figure I. The results show that the matt black finish reduces the top speed by about 8 m.p.h. compared with the smooth black finish.

The position of the Mark VIII pressure head on the tail is given in Fig. 2 and the position error correction for this head in Fig.3. The position error was measured with both the smooth and matt black finishes and these gave identical results.

TABLE I.

Level speed measurements with matt black finish (RDM/2A).

Height in standard atmosphere. (feet)	True Air speed. (M.p.h)	A.S.I. ϕ m.p.h.	Position error correction m.p.h. ϕ	Compress-ibility correction m.p.h.	R.P.M. (Mean)	Boost lb/sq.in. (Mean)	Super-charger gear.
18,000	345.5	246	+19.1	-4.5	3000	8.3	F.S.
20,000	352.5	243.5	+18.8	-5.0	↓	8.3	↓
21,400*	358	241.5	+18.7	-5.4		8.3	
22,000	357	239	+18.4	-5.5		7.8	
24,000	354	229.5	+17.6	-5.6		6.4	
25,000	352	224.5	+17.1	-5.6		3.7	

*Full throttle height.

TABLE II.

Level speed measurements with smooth black finish (D.T.D.308)

Height in standard atmosphere. (ft)	True air speed. (m.p.h)	A.S.I. ϕ m.p.h.	Position error correction m.p.h. ϕ	Compress-ibility correction m.p.h.	R.P.M. Mean.	Boost. lb/sq.in. (Mean)	Super-charger gear.
18,000	355.5	253.5	19.8	-4.8	3000	8.5	F.S.
20,000	361.5	250	19.5	-5.4	↓	8.5	↓
21,400*	366	247	19.2	-5.8		8.5	
22,000	365.5	244.5	18.9	-5.8		8.0	
24,000	362	234.5	18.1	-6.0		6.6.	
25,000	360	229.5	17.6	-6.0		5.9	

* Full throttle height.

Courtesy of Neil Stirling

ϕ A.S.I. and Position Error corrections are for the A.S.I. connected between pressure and static sides of the Mark VIII head.

Discussion of results.

The difference of speed (8 m.p.h.) between smooth and matt finish, shows a large discrepancy compared with the results obtained by Messrs. de Havillands. It is pointed out that the matt black finish on W.4076 was considered by Messrs. de Havillands to be slightly less rough and the smooth finish slightly less smooth than that tests by them on W.4082.

It is of interest that the speed obtained by us with the matt black finish is 6 m.p.h. faster than that obtained by Messrs. de Havillands with a similar finish. Also the speed with the smooth finish is 12 m.p.h. slower than that obtained by the firm. Thus our speeds are intermediate between those obtained by the firm with the two finishes, and our results do not confirm either of their figures. This difference would be accounted for if the assumption, previously made, that our finishes were less rough and smooth respectively, is accepted.

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MOSQUITO F Mk II W 4076

LEVEL SPEEDS AND BOOST AT HEIGHTS

WEIGHT ~ 18,530 LBS
SPEEDS ARE REDUCED ON $P\frac{1}{2}$ $O\frac{1}{2}$ BASIS

— MATT BLACK FINISH (R.D. M.2A)
- - - SMOOTH BLACK FINISH (D.T.D. 308)

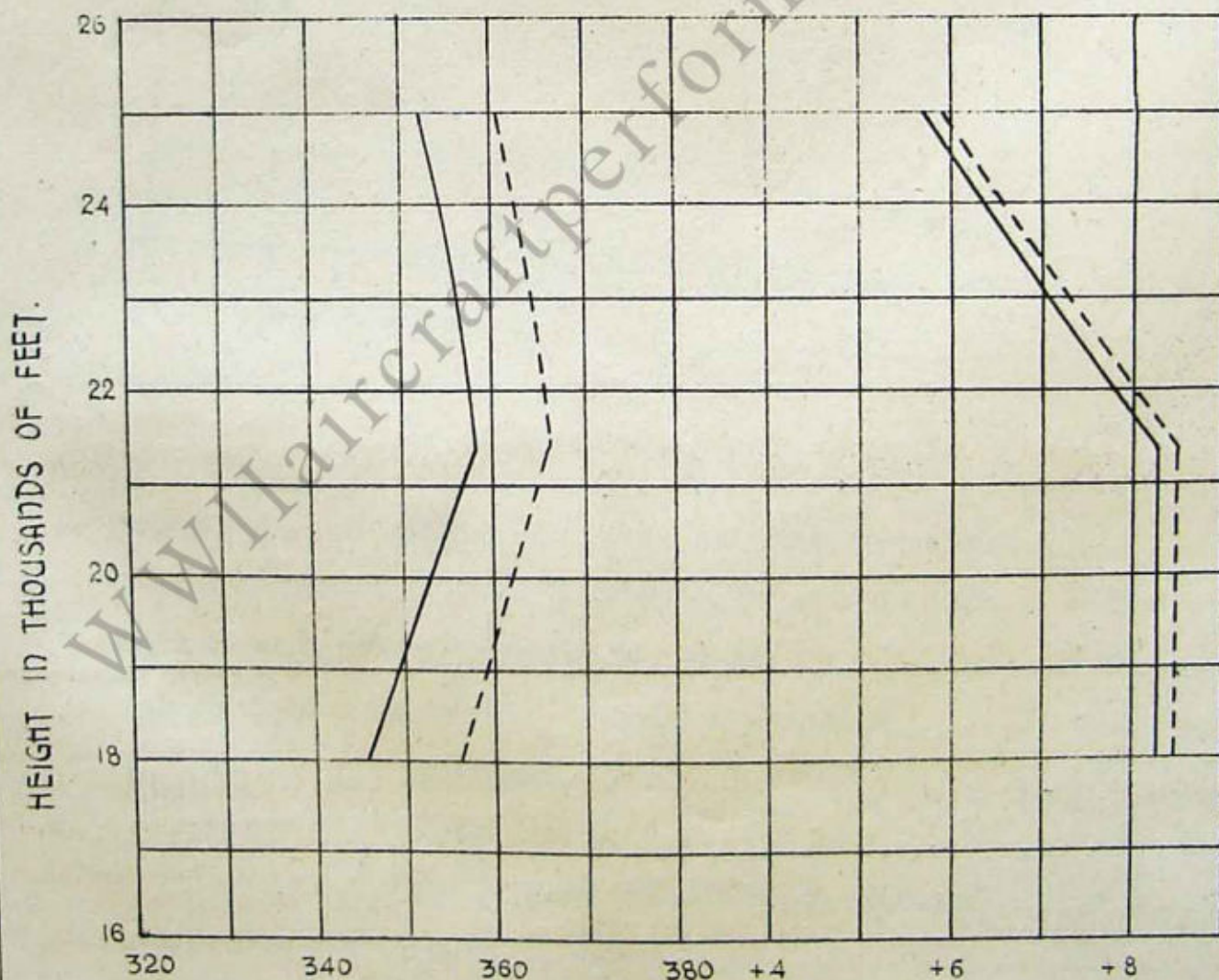
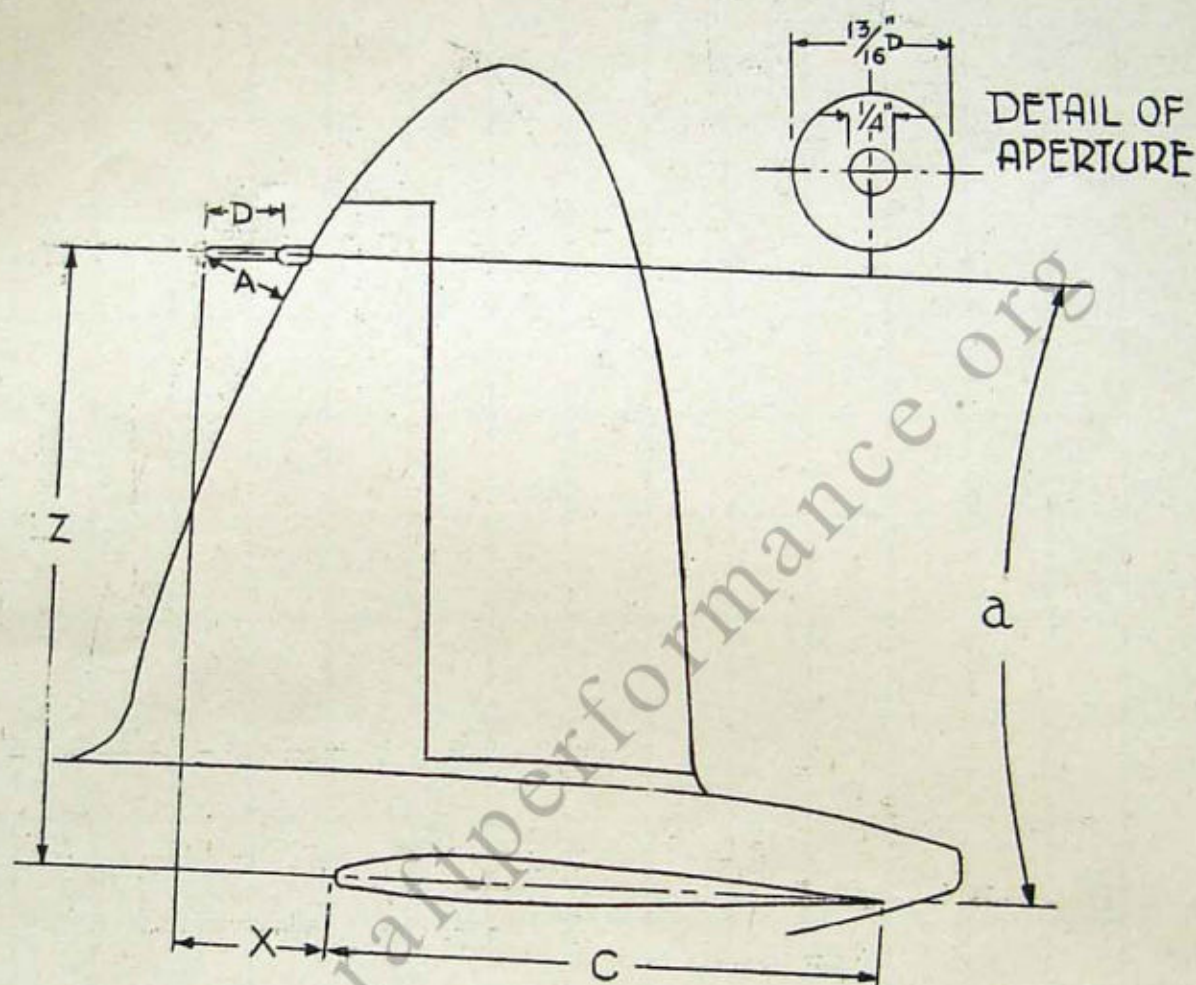


FIG 2

MOSQUITO II W 4076

PRESSURE HEAD POSITION



	TYPE OF PRESSURE HEAD	NOT MARKED ON HEAD
	RATIO OF APERTURE OF TUBE TO EXTERNAL DIA. OF STATIC TUBE	30.8%
a	ANGLE OF STATIC TUBE TO CHORD OF TAIL PLANE	0° 20'
A	NOSE OF STATIC TO L.E. OF FIN (minimum distance)	10 3/8"
D	" " " " SUPPORTING STRUT	6 7/16"
Z	" " " " CHORD LINE	6' 0 3/4"
X	" " " " T.P. LEADING EDGE (PARALLEL TO CHORD)	19"
C	LENGTH OF CHORD AT ROOT	5' 6 1/4"
Y	DISTANCE FROM PLANE OF SYMMETRY	NIL
	POSITION	⊥ OF AEROPLANE ~ L.E. OF FIN
	SEMI SPAN OF T.P.	10' 4 1/2"

MOSQUITO FMkII W4076

POSITION ERROR CORRECTION

FOR Mk VIII PRESSURE HEAD ON FIN

WEIGHT ~ 18,530 LBS.

APPROVED

CHK.

CHECKED

DATE OF TEST 8/28/3/42

TRACED. E. A. ARNOLD

CURVE NO 3918

767A

8TH PART OF REPORT NO 04AEE

A S I M. P. H.

