

~~MOST SECRET~~

Mr. W. C. Cooper. R.T.p.2.

7th Part of Report No. A. & A.E.E./767,c.

20 MAY 1943

AVIA.18/716

AIRCRAFT AND ARMAMENT EXPERIMENTAL ESTABLISHMENT

BOSCOMBE DOWN

COPY NO. .2...

Mosquito B Mk. IV D.K. 290/G

(2 Mk. IV 21's)

STOCK

2

Level speed performance and position error trials

with and without stores carried

98 AUTHORISED

DATE 19.12.52

A. & A.E.E. ref:- 4487/44 - A.M. 61/9 12

M.A.P. ref:- S.E. 44574/RDL1(8)/HD

Period of tests:- 8th April to 5th May 1943

This report deals with the aircraft 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 Ministry of Aircraft Production.

Progress of issue of report

Report No.	Title
2nd Part of A. & A.E.E./767,c.	D.K. 290 - Brief handling, longitudinal stability and dives.
3rd do.	D.K. 327 - Brief handling and stability tests with large elevator horn balance.
4th do.	D.K. 290 - Flame damping trials with multi-fishtail ejector (de Havilland design) exhausts
5th do.	D.K. 290/G Brief handling trials without stores fitted.
6th do.	D.K. 290/G Brief handling trials with stores in situ.

1. Introduction.

A number of Mosquito B Mk. IV aircraft are being modified to carry certain stores in the bomb bay. To accommodate these items, two in number, the bomb bay has been modified. Brief level speed and fuel consumption measurements were required with the bomb bay empty, and with the stores in situ. This Part of the Report deals only with the level speed performance, and position error measurement.

A separate Part of the Report will deal with the fuel consumption and range determination.

2. Condition of aircraft relevant to tests.

2.1 General. The above aircraft was a production Bomber Mosquito with a mock-up installation of a modification which is being made to a limited number of Mk. IV Mosquitoes for special duties. The bomb bay was modified to carry two stores weighing approximately 1,100 lb. each. To accommodate these items, the bomb doors have been removed, and a streamlined fairing built round the edges of the bomb bay. A photograph of the empty bomb bay is given in the 5th Part and of the stores installed in the 6th Part of this Report.

The engine installation was fitted with sets of multi-ejector stub exhausts which were under test when the aircraft was sent from here for the urgent incorporation of the modification to the bomb bay.

The air speed system was standard for the type, there being a static vent on the port side of the nose, and a Mk. VIII pressure head carried on the leading edge of the fin (See Figs. 3 and 4).

In all other respects the aircraft was identical in condition to that given in the 2nd Part of this Report.

2.2 Engine numbers and limitations. The relevant engine limitations at the time of test of the Merlin 21 engines fitted, and the engine numbers, are given below :-

Condition	R.P.M.	Boost (lb/sq.in.)	S/c gear	Engine numbers		
					Port	Stbd.
All out level (5 mins.)	3000	+12	M.S. & F.S.	Maker's	49807	62013
Max. weak cruising	2650	+4	M.S. & F.S.	Air Ministry	A242624	A251517

2.3 Loading. The aircraft was flown at two loadings, one with mock-up stores fitted, and the other without (See table below). The maximum operational weight fully loaded is approximately 21,000 lb., but as the mock-up stores weighed only about 30 lb. each, the highest weight which could be obtained with safety with internal ballast was 19,555 lb.; the tests with stores were therefore done at this weight.

Loading II below represents the highest weight obtainable with stores removed, i.e. with the aircraft less stores but with full fuel.

Loading	Take-off Weight (lbs)	Centre of gravity (Ins. aft of datum)	Condition
I	19,555	18.3	Stores IN
II	18,760	18.3	Stores OUT

3. Scope of tests.

Level speed measurements were made at the two loadings above between 2,000 and 15,000 feet in M.S. supercharger at the following engine conditions:-

- (i) All-out level power
- (ii) Maximum weak mixture cruising power.

The position error of the static vent was measured in level flight, flaps and undercarriage up, both with and without stores in situ.

4. Results of tests.

4.1 Level speed performance. The results have been corrected to standard atmospheric conditions and to 95% of the respective take-off weights by the methods of A. & A.E.E./Res/170.

The level speed performance at the above weights is shown in Fig.1 and Table I. In addition, the results have been further corrected (by the methods of the above Report) for a weight of 20,000 lb. with stores in, i.e. 95% of the estimated operational take-off weight of 21,000 lb. and for a weight of 16,500 lb. with the stores out. This latter weight would result after dropping the stores at the target. These estimated results are also shown in Fig.1 and given fully in Table II.

The results are summarised below :-

Condition	Weight (lbs)	Height (feet)	All-out level power			Max. weak cruising power		
			R.P.M.	Boost (lb/sq.in)	T.A.S. (m.p.h)	R.P.M.	Boost (lb/sq.in)	T.A.S. (m.p.h.)
Stores IN ↓	20,000	2,000	3000	+12	321	2650	+4	272
		11,700		+12	364			-
		15,000		+ 8.9	360			323
	18,600	2,000		+12	323			274
		11,700		+12	366			-
		15,000		+ 8.9	362			325
Stores OUT ↓	17,820	2,000		+12	323			274
		11,700		+12	366			-
		15,000		+ 8.9	362			325
	16,500	2,000		+12	326			277
		11,700		+12	369			-
		15,000		+ 8.9	365			329

■ Full throttle height under all-out level power conditions.

4.2 Position error correction. The position error correction (shown in Fig.4) was found to remain unchanged when the stores were removed. In both cases the position error correction was +3 m.p.h. throughout the range tested, at a weight of 19,500 lb.

The correction to the altimeter when connected to the static of the air speed system is shown in Fig.5.

5. Discussion of results.

It will be seen from Fig. 1 and Table I that the measured speeds were found to be identical, stores in and stores out, when corrected to a mean weight of 18,600 lb. and 17,820 lb. respectively (i.e. 95% of the weights at take-off during tests). Correcting these results to the same weight, the speeds with the stores in become only slightly greater (approx. 1 m.p.h.) than those obtained with the stores out.

TABLE I

Level speed performance

Stores IN, corrected to mean weight of 18,600 lb.

Stores OUT, corrected to mean weight of 17,820 lb.

Radiator shutters closed. Cold air intake

Standard height (feet)	True Air speed (m.p.h.)	A. S. I. (m.p.h.)	Corrections (m.p.h.)		Mean R. P. M.	Mean boost (lb/sq. in)	Supercharger gear
			P. E. C.	C. E.			
2,000	323	311	+3.0	-0.5	3000	+12	M. S.
4,000	332	310	↓	-1.0	↓	↓	↓
6,000	341	310	↓	-1.5	↓	↓	↓
8,000	350	309	↓	-2.1	↓	↓	↓
10,000	359	308	↓	-2.7	↓	↓	↓
11,700	366	306	↓	-3.4	↓	+12	↓
14,000	365	295	↓	-3.8	↓	+ 9.7	↓
15,000	362	288	↓	-3.9	↓	+ 8.9	↓
2,000	274	263	+3.0	-0.3	2650	+ 4	M. S.
4,000	282	263	↓	-0.6	↓	↓	↓
6,000	290	263	↓	-1.0	↓	↓	↓
8,000	298	262	↓	-1.3	↓	↓	↓
10,000	306	261	↓	-1.7	↓	↓	↓
12,000	314	260	↓	-2.2	↓	↓	↓
14,000	321	259	↓	-2.7	↓	↓	↓
15,000	325	258	↓	-2.9	↓	↓	↓

* Full throttle height.

TABLE II

Estimated level speed performance at 20,000 lb. (stores IN)
and 16,500 lb. (stores OUT)

Radiator shutters closed. Cold air intake

Standard height (feet)	Mean R. P. M.	Mean boost (lb/sq. in)	S/c gear	Stores IN	Stores OUT
				Mean wt. 20,000 lb. True air speed (m.p.h.)	Mean wt. 16,500 lb. True air speed (m.p.h.)
2,000	3000	+12	M. S.	321	326
4,000	↓	↓	↓	330	335
6,000	↓	↓	↓	339	344
8,000	↓	↓	↓	348	353
10,000	↓	↓	↓	357	361
11,700	↓	↓	↓	364	369
14,000	↓	+ 9.7	↓	363	368
15,000	↓	+ 8.9	↓	360	365
2,000	2650	+ 4	M. S.	272	277
4,000	↓	↓	↓	280	285
6,000	↓	↓	↓	288	293
8,000	↓	↓	↓	296	301
10,000	↓	↓	↓	304	309
12,000	↓	↓	↓	312	317
14,000	↓	↓	↓	319	325
15,000	↓	↓	↓	323	329

* Full throttle height.

Circulation List

Chief Technical Officer.

C. R. D.

D. C. R. D.

D. T. D. (6 COPIES)

D. A. M. D. (2 ")

D. R. A. E.

T. D. Admin.

R. T. P. 2.

R. T. O. de Havillands (2 COPIES)

Air Commodore, Commanding A. & A. E. E., Royal Air Force.

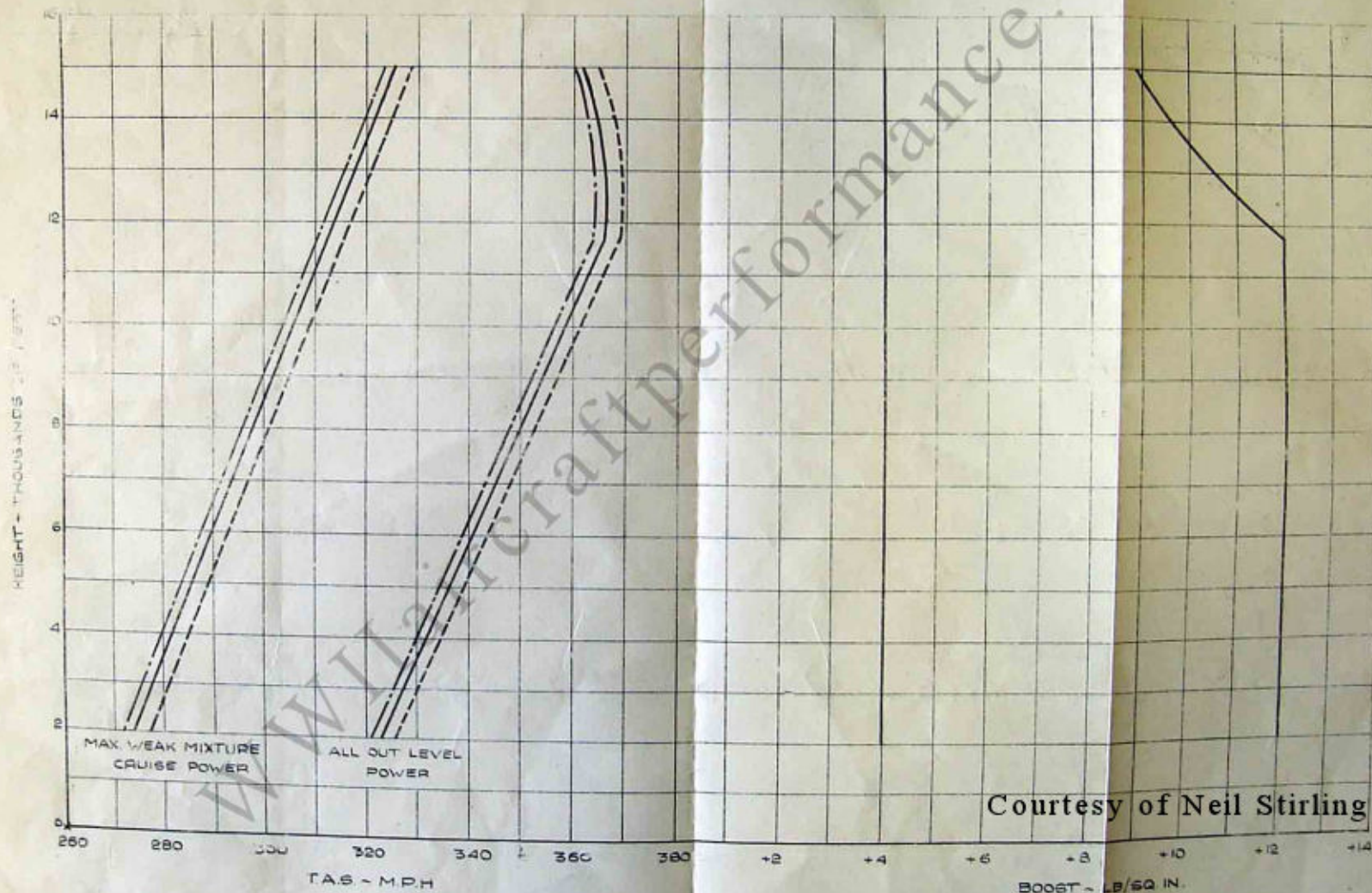
Courtesy of Neil Stirling

MOSQUITO IV DK.290/G

(2 MERLIN 21's)

LEVEL SPEED PERFORMANCE AT HEIGHT

- STORES IN; WEIGHT - 18,600 LB
- - - STORES OUT; WEIGHT - 17,820 LB
- STORES IN; WEIGHT - 20,000 LB
- - - STORES OUT; WEIGHT - 19,500 LB



Courtesy of Neil Stirling

Fig. 1

APPROVED

CHECKED

DATE

BY

TEST

NO.

OF

TESTS

PERFORMED

ON

THIS

DATE

TEST

NO.

OF

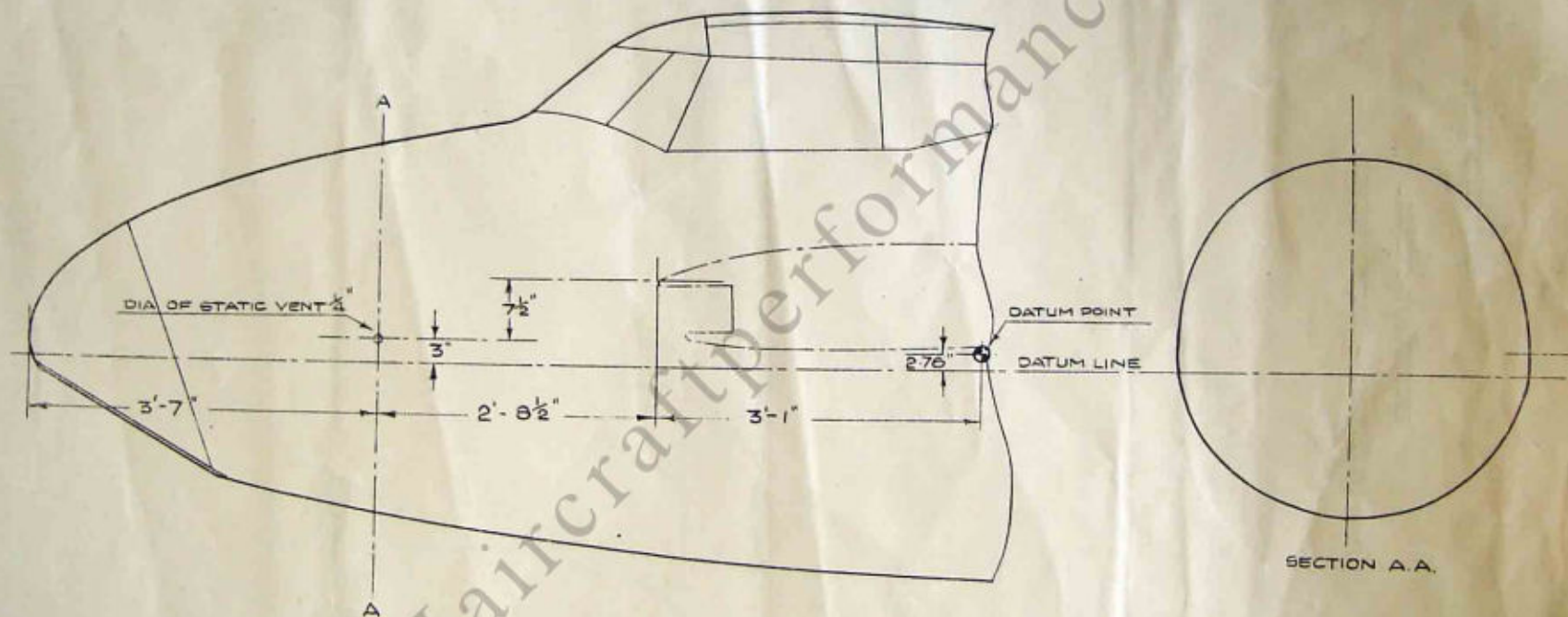
TESTS

PERFORMED

Fig. 2

MOSQUITO IV DK.290/G.

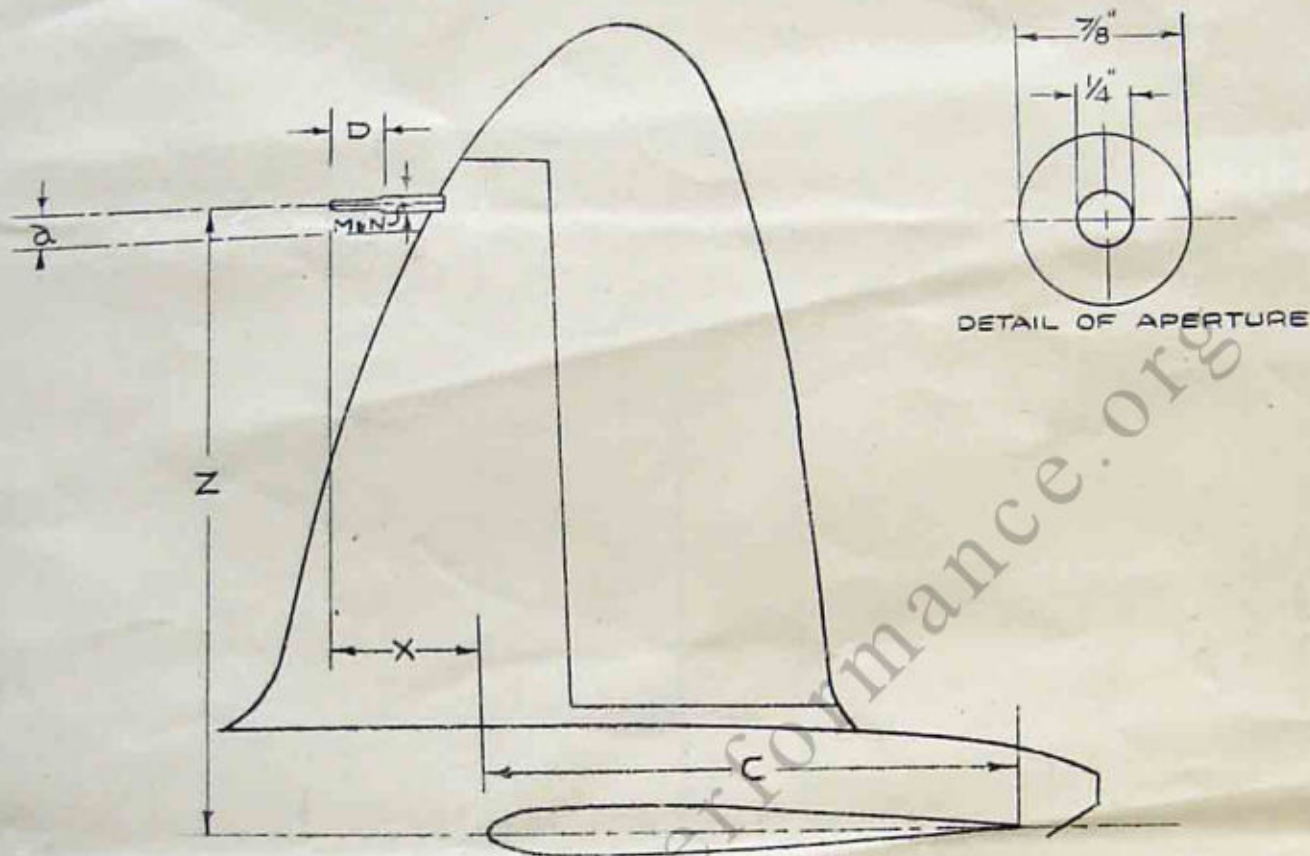
LOCATION OF STATIC VENT



MOSQUITO IV D.K-290

PRESSURE HEAD POSITION

FIG.3



TYPE OF PRESSURE HEAD	NOT STATED
RATIO OF APERTURE OF TUBE TO EXTERNAL DIA OF STATIC TUBE	28.6%
INCIDENCE OF TAIL PLANE (AT ROOT)	-0°-30'
(A) ANGLE OF STATIC TUBE TO CHORD OF TAIL PLANE	+0°-15'
(D) NOSE OF STATIC TO SUPPORTING STRUT	6 ⁹ / ₁₆ "
(Z) " " " " CHORD LINE OF T.P.	6'-3 ¹ / ₄ "
(X) " " " " T.P. LEADING EDGE (PARALLEL TO CHORD)	16 ³ / ₄ "
(C) LENGTH OF CHORD OF T.P. (AT ROOT)	5'-1 ¹ / ₄ "
(M) MAJOR AXIS OF STRUT	1 ³ / ₄ "
(N) MINOR " " "	1 ³ / ₄ "
DISTANCE FROM PLANE OF SYMMETRY	NIL
POSITION	CL OF A/C L.E. OF FIN
SEMI-SPAN	10'-4 ¹ / ₂ "

MOSQUITO IV DK 290/G

FIG.4.

(2 MERLIN 21's)

POSITION ERROR CORRECTION

WEIGHT - 19,500 LB.
FOR STORES IN OR OUT



CORRECTION - M.P.H.

APPROVED: *[Signature]* DO. TRACED: A.A. DATE OF TEST: 5-5-43. CHECKED: *[Signature]* CURVE No. 5237. PART OF REPORT No. AVALIE/767.

www.aircraftperformance.org

WEIGHT ~ 19,500 LB.
STORES IN OR OUT.

