

AVL/118716

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3rd Part of Report No. A. & A.E.E./767, h.
20 FEB 1944

AIRCRAFT AND APPLIANCE EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

Mosquito B Mk. IX LR.495
(2 Merlin 72)

UNCLASSIFIED

Level speed performance
with two external 500 lbs. bombs fitted

A. & A.E.E. ref: CTO/AM. 61/18
M.A.P. ref: RA4681/11-SB. 2150/SBL 5902/TDL 1b.
Period of tests: August 1943 - January 1944

DATE	19/12/52	7
REVISION	12	
AUTHORISED		
20.12.52		

This report deals with the aircraft 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 Ministry of Aircraft Production.

Progress of issue of report

Report No.	Title
3rd Part of A. & A.E.E./767, h.	L.R.495 - Cooling trials without external bombs or fuel tanks.
4th do.	L.R.495 - Performance trials without external bombs or fuel tanks.
5th do.	L.R.495 - Cooling trials with 2 external 500 lb. bombs.
6th do.	L.R.495 - Climb performance with 2 external 500 lb. bombs.
7th do.	M.M.235 - Suitability tests of Hamilton "paddle-blade" propellers with British C.S. units.

Summary.

Level speed tests have been made on this aircraft at the maximum permissible take-off weight of 22,850 lb., corresponding to the bomber overload condition with external 500 lb. bombs on faired racks under the wings. The tests were made at the normal maximum rating of +18 lb/sq.in. boost and repeated at an increased rating of +21 lb/sq.in. boost.

The principal results are as follows:-

M.S. gear.

Maximum level speed	(+18 lb/sq.in boost)	373 mph at 13000 ft.
" " "	{+21 " " " " }	375 mph at 10600 ft.
" cruising "	{+7 " " " " }	334 mph at 18400 ft.

F.S. gear.

Maximum level speed	(+18 lb/sq.in. boost)	383 mph at 25100 ft.
" " "	{+21 " " " " }	388 mph at 23000 ft.
" cruising "	{+7 " " " " }	345 mph at 30800 ft.

Use of +21 lb/sq.in. boost instead of +18 lb/sq.in. boost increases the top speed below the full throttle heights by 12 mph in M.S. gear and 13 mph in F.S. gear.

The reduction in speed due to fitting the two external 500 lb. bombs on faired racks is not known exactly owing to deterioration of the airframe between the two sets of tests but it appears to be of the order of 15-18 mph.

1. Introduction.

Performance trials have been made on this aircraft in the overload bomber condition, with two external 500 lb. bombs in addition to the normal load of four 500 lb. bombs carried internally. This Part of the Report deals with level speed trials, including trials at the increased boost rating of 21 lb/sq.in.

Provisional results were forwarded to M.A.P. in a letter dated 28th January, 1944.

2. Condition of aircraft relevant to tests.

2.1. General. The condition of the aircraft was exactly as described in the 5th Part of this Report, whilst reference may be made to photographs appended to the 3rd Part of this Report.

2.2. Loading. The tests were made at a take-off weight of 22,850 lb., with the C.G. at 16.6" aft of the datum point, undercarriage down. This corresponds to maximum permissible load with fuel, oil and equipment, two crew, four 500 lb. bombs in the bomb bay, and two 500 lb. bombs on faired racks under the wings.

2.3. Engine details and limitations.

2.31. The numbers of the Merlin 72 engines fitted at the time of test were:-

<u>Port</u>	<u>Starboard</u>
109461/A.399000	109463/A.399001

2.32. The relevant limitations were:-

	<u>RPM</u>	<u>Boost</u> <u>lb/sq.in.</u>
Max. all-out level (5 mins)	3000	+18
" " " " (5 mins)	3000	
Special	3000	+21 *
Max. cruising	2650	+ 7

* All tests at boosts above +18 lb/sq.in. were done with 150 grade fuel (to Specification RDE/T/253) which was carried in the outer wing tanks.

2.33. Merlin 72 engines are fitted with single level carburettors, i.e. the mixture control is fully automatic. The supercharger gear change circuit was modified so that either MS or FS gear could be selected at will.

2.4. Propellers. De Havilland Hydromatic, 12 ft. diameter, 5-bladed (metal) Type A5/147.

Hub serial nos.	<u>Port</u> NK. 4948	<u>Starboard</u> NK 3768
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3. Tests made.

3.1. Level speed trials were done between ground level and 34,000 feet at normal all-out and increased power conditions, and maximum cruising conditions.

4. Results.

4.1. These have been corrected to ICAN standard atmospheric conditions, and to 95% of the take-off weight by the methods of Report No. A.& A.E.E./Res/170. The compressibility error correction used was based on the methods of Addendum to Report No. A.& A.E.E./Res/147. The position error correction used was measured on this aircraft and is given in the 2nd Part of Report No. A.& A.E.E./767,h.

4.2. The results are given fully in Fig.1. and Tables I to III. Figure I also gives, for comparison, the curve of true airspeed obtained on this aircraft at a mean weight of 20,800 lb. without the external bombs fitted.

5. Discussion of results.

5.1. Comparison of level speed results may be made with those obtained on the same aircraft at 21,910 lb. without the external bombs or faired racks fitted. (4th Part of Report No. A.& A.E.E./767,h). In other respects the condition of aircraft was the same in each case, so that the difference between the two sets of results should give the effect on speed of the extra weight and drag of the external bombs and racks.

Comparing the maximum all-out level speeds at +18 lb/sq.in. boost, the loss in speed due to fitting the bombs appears to be 20 mph in MS gear and 22 mph in FS gear.

/However

However, 4 or 5 months elapsed between the two sets of tests, decrease in speed, due presumably to deterioration of the airframe was present in FS gear to the extent of about 5 mph at all-out level power conditions.

(Tests were in progress to establish this point when the aircraft crashed).

It appears therefore that the true reduction in level speed at all-out power due to fitment of the external bombs is of the order of 15-18 mph.

TABLE I
All-out level speed FS gear
Rad. flaps closed 3000 RPM 21700 lb. (95% T.O. Wt.)

Height feet	TAS mph	ASI mph	Corrections		Mean boost ₂ lb/in
			PE mph	CE mph	
2000	332	330	-7½	-½	+18.0
4000	340	329	-7½	-1½	
6000	347	327	-7½	-2	
8000	355	324	-7½	-2½	
10000	362	321	-7½	-3	
12000	369	318	-7	-4	
*13000	373	317	-7	-4½	
14000	373	312	-7	-4½	+16.8
16000	371	301	-6½	-4½	+14.5
18000	367	288	-6	-5	+12.3
20000	363	276	-5½	-5	+10.1
22000	359	264	-5½	-5½	+ 8.2
2000	344	343	-8	-½	+21.0
4000	352	341	-7½	-1½	
6000	359	338	-7½	-2	
8000	367	336	-7½	-2¾	
*10600	375	330	-7½	-3½	∇
12000	374	323	-7½	-4	+19.1

* Full throttle heights.

/Table II

Circulation List.

C.R.D.	A.D.R.D.E.4.
D.D.A.P.7.	A.D.R.D.L.1. 2 (1 for action)
D.T.D.	A.D.D.A.N.A.
D.D.T.D.	O.C. Handling Sqdn.
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TABLE II

All-out level speeds F.S. gear
Rad. flaps closed. 3000 RPM. 21700 lb. (95% T.O. Wt.)

Height feet	TAS mph	ASI mph	Corrections		Mean boost lb/in ²
			PE mph	CE mph	
16000	350	283	-6	-4	+18.0
18000	357	280	-6	-4½	↓
20000	364	276	-5½	-5	↓
22000	371	273	-5½	-5½	↓
24000	379	270	-5½	-6¼	↓
*25100	383	268	-5½	-6¼	↓
26000	381	262	-5½	-6½	+16.8
28000	374	248	-4½	-6	+14.2
30000	368	235	-4½	-5¾	+11.8
32000	360	221	-4	-5½	+ 9.7
34000	352	208	-3½	-5½	+ 7.4
16000	362	293	-6½	-4½	+21.0
18000	370	291	-6¼	-5	↓
20000	377	287	-6	-5¾	↓
22000	384	283	-6	-6	↓
*23000	388	281	-6	-6½	↓
24000	386	275	-5½	-6½	+19.5

TABLE III

Cruising level speeds
Rad. flaps closed. 2650 RPM. 21700 lb. (95% T.O. Wt.)

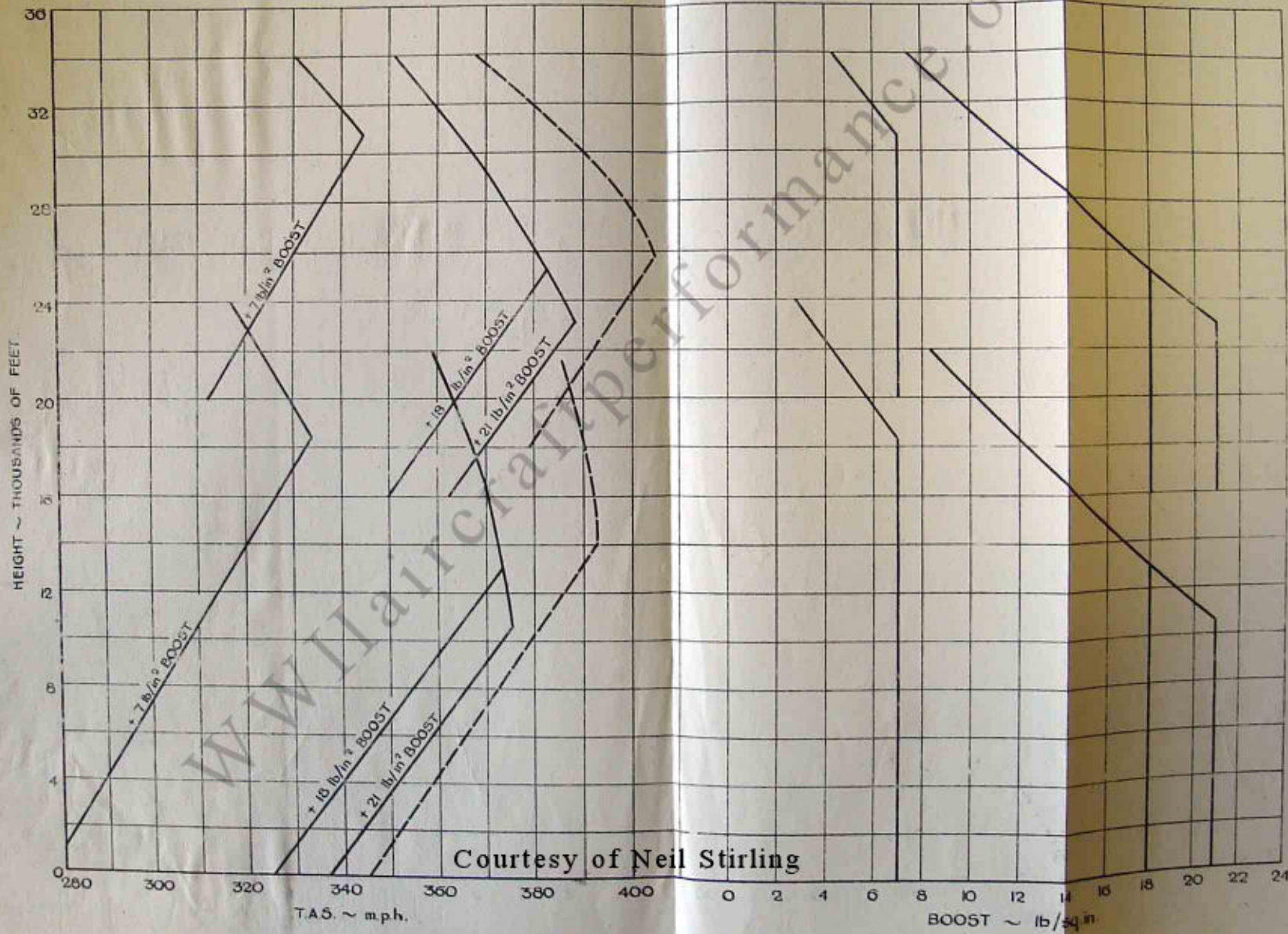
Height feet	TAS mph	ASI mph	Corrections		Mean boost ₂ lb/in ²	S/C gear
			PE mph	CE mph		
2000	283	281	-6	-1½	+7.0	M.S.
6000	296	278	-5¾	-1½	↓	↓
10000	308	272	-5½	-2	↓	↓
14000	320	266	-5½	-3	↓	↓
*18400	334	259	-5½	-3½	↓	↓
20000	329	249	-4½	-3½	+5.8	↓
22000	323	236	-4½	-3½	+4.2	↓
24000	317	224	-4	-3½	+3.1	↓
20000	312	235	-4½	-3½	+7.0	F.S.
24000	324	229	-4½	-3¾	↓	↓
28000	336	221	-3¾	-4¼	↓	↓
*30800	345	216	-3½	-5	↓	↓
32000	340	208	-3½	-4¾	+6.0	↓
34000	330	195	-3	-4½	+4.3	↓

* Full throttle heights.

LEVEL SPEED PERFORMANCE.

TWO EXT. 500 LB. BOMBS FITTED.
CORRECTED TO 95% T.O. WT. = 21,700 LB.

----- SAME AIRCRAFT AT 20,800 LB (WITHOUT EXTERNAL BOMBS)



Courtesy of Neil Stirling

APPROVED 4-1-50
CHECKED 9-2-44
TOACED I.M.P. DATE 9-2-44
CURVE NO. 6050
B X LD 495
MOSQUITO B X LD 767
A.C.A.E.L. 767