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12th Part of Report No. A. & A.E.E./767, e

1 FEB 1944

AIRCRAFT AND ARMAMENT EXPERIMENTAL ESTABLISHMENT BOSCOMBE DOWN

Mosquito FB.Mk.VI. HX.809
(2 Merlin 25s)

Level speed performance at normal & increased boost rating

A. & A.E.E. ref:- CTO/AM.61/10.
M.A.P. ref: RA.4681/11/RDL1 (b)
SB.37160 /RDL1 (b)
Period of tests:- December 1943 - January 1944.

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
7th Part of A. & A.E.E./767, e	HJ.679 - Brief performance tests.
8th -do-	HJ.679 - Engine cooling trials.
9th -do-	HJ.679 - Effect of altitude on radiator suitability and oil cooling.
10th -do-	HX.809 - Position error of static vent.
11th -do-	HX.918 - Attitude and position error measurements, with 8 aircraft rockets fitted.

Summary

Level speed performance at +18 lb/sq.in. boost and +25 lb/sq.in. boost has been completed on Mosquito FB.Mk.VI, HX.809.

The principal results are as follow:-

MS gear

Max. speed at +18 lb/sq.in. boost = 353 mph at 5100 ft.
" " " max. full throttle boost (23.9 lb/sq.in.) = 354 mph at sea level.

Use of +23.9 lb/sq.in. boost instead of +18 lb/sq.in. at sea level increases the speed by 22 mph.

FS gear

Max. speed at +18 lb/sq.in. boost = 363 mph at 12500 ft.
" " " +25 lb/sq.in. " = 369 mph at 7200 ft.

Use of 25 lb/sq.in. boost instead of +18 lb/sq.in. increases the speed below full throttle height by 23 mph.

Comparison of results @ +18 lb/sq.in. boost with those of Mosquito VI HJ.679, indicate that the speed of that aircraft is of the order of 10-15 mph below average, thus supporting the conclusion made in the 7th part of report No. A. & A.E.E./767, e, that HJ.679 was not fully representative of the type.

1. Introduction.

1.1. Performance trials at +25 lb/sq.in. boost were required on a Mosquito aircraft with Merlin 25 engines. Mosquito VI HX.809 was allotted for these tests and this report deals with the results, together with level speeds at +18 lb/sq.in. boost for comparison. The latter tests were used as a comparison with the results of Mosquito HJ.679, requested by M.A.P. by letter of 22nd November 1943.

Provisional results were forwarded to M.A.P. by letter dated 17th January 1944.

2. Condition of aircraft relevant to tests.

2.1. General. Following are the chief external features:-

Courtesy Neil Stirling

/Aerial

Aerial mast, no external aorials.
 Four 20 mm Hispano guns in the nose with muzzle caps, and open ejector chutes.
 Four 0.303 inch Browning guns in the nose with muzzle caps.
 Camera gun port in the nose.
 No external ice-guards on the intakes.
 Twin saxophone exhausts with flame damping shrouds.
 External fuel tank under each wing.

2.2. Loading. The take-off weight of the aircraft was 21,430 lb. with the C.G. at 14.9 ins. aft of datum, undercarriage down.

2.3. Engine details and limitations.

2.31. The numbers of the Merlin 25 engines fitted were:-

<u>Port</u>	<u>Starboard</u>
119001/A.403290	119079/A.403329

2.32. The relevant limitations were:-

	<u>RPM</u>	<u>Boost, lb/sq.in.</u>
Max. for level flight (5 mins)	3000	+18
Max. for combat (5 mins) Special.	3000	+25 *

* For boosts exceeding +18 lb/sq.in. 150 grade fuel to specification RDE/F/253 was used. This was carried in the outer wing tanks and the external tanks.

The supercharger gear change circuit was modified so that MS or FS gear could be selected at will.

2.4. Propellers. De Havilland Hydromatic, 12 ft. diameter, 3-bladed metal, type A.5/147.

	<u>Port</u>	<u>Stbd</u>
Hub serial Nos.	NK.21822	NK.22373

3. Tests made.

3.1. Level speed tests were done between ground level and 11,000 ft. in MS gear and between ground level and 18,000 ft. in FS gear. In each gear the tests were done with the boost controlling at +25 lb/sq.in. and 18 lb/sq.in. or at full throttle.

4. Results.

These were corrected to ICAN standard conditions and to 95% of the take-off weight by the methods of Report No. A. & A.E.E./Res/170, the C.E.C. being based on methods given in Addendum to Report No. A. & A.E.E./Res/147.

The P.E.C. used was measured on this aircraft and is given in the 10th Part of Report No. A. & A.E.E./767, e.

Details of the results are given in Fig.1 and Table I.

4.1. It will be seen that the maximum boost attainable in MS gear with this installation of the Merlin 25 engine is +23.9 lb/sq.in. at sea level. Use of this boost instead of +18 lb/sq.in. gives an increase in top speed of 22 mph.

In FS gear, use of +25 lb/sq.in. boost instead of +18 lb/sq.in.:-

- (a) Increases the top speed from 363 to 369 mph.
- (b) Reduces the full throttle height from 12,500 feet to 7,200 ft.
- (c) Increases the maximum speed below the full throttle heights by 23 mph.

5. Comparison with Mosquito FB. Mk.VI. HJ.679.

5.1. In the 7th Part of Report No. A.& A.E.E./767,e, Mosquito VI.HJ679 was thought to be not truly representative of the type and a check on another aircraft was recommended.

The only differences in external equipment between HJ.679 and HX.809 are:-

- (i) HJ.679 had a single aerial running from the mast to the leading edge of the tail fin, whereas HX.809 had no external aeri-als.
- (ii) HJ.679 was fitted with multi-stub single ejector exhausts, whilst HX.809 had ducted saxophone exhausts.

5.2. Comparison of the level speeds of the two aircraft at full throttle and +18 lb/sq.in. boost shows agreement within 3 or 4 mph in both MS and FS gear. This agreement, however, is not to be expected since the two aircraft were fitted with different exhaust manifolds. In tests reported in the 12th part of Report No. A.& A.E.E./767,c, it was shown that use of ducted saxophone exhausts in place of the single ejector type reduced the top speed at +9 lb/sq.in. boost of Mosquito IV DK.290 by 13 to 15 mph. Mosquito HJ.679 would, therefore, be expected to be faster than HX.809 by about the same margin.

The conclusion drawn in the 7th Part of Report No. A.& A.E.E./767,e, namely that Mosquito HJ.679 was not truly representative of the type thus appears to be borne out by the present tests.

6. Maintenance.

No particular trouble was encountered, attendant upon the use of +25 lb/sq.in. boost, only two exhaust stubs being burned out during the course of the trials.

7. Conclusions.

7.1. The maximum boost obtainable in MS gear is 23.9 lb/sq.in. and is reached at sea level. Use of this boost instead of +18 lb/sq.in. increases the top speed at sea level by 22 mph.

7.2. The raising of the maximum boost from +18 lb/sq.in. to +25 lb/sq.in. gives an increase in speed below full throttle height of 23 mph in FS gear on Mosquito VI HX.809. The top speeds are 363 mph at +18 lb/sq.in. boost, and 369 at +25 lb/sq.in. boost.

7.3. This report confirms that the speed of Mosquito FB.Mk.VI HJ.679 was appreciably below average.

TABLE I
Level speed performance
 Rad, flaps shut. Corrected to 20,400 lb (95% T.O. wt.)

Height ft	TAS mph	ASI mph	Corrections to ASI mph		Mean Boost lb/sq.in.	RPM	S/C gear
			P.E.	C.E.			
0	354	360	-5½	0	+23.9	3000	MS
2	354	350	-5	-¾	+21.5		
4	354	340	-4½	-1½	+19.2		
6	353	329	-4	-2	+17.0		
8	351	318	-3¾	-2½	+14.9		
10	349	306	-3	-2¾	+12.8		
11	348	300	-2¾	-2¾	+11.8		
0	332	337	-4½	0	+18.0		
2	340	335	-4¾	-¾			
4	349	335	-4½	-1½			
*5.1	353	334	-4½	-1¾			
0	340	345	-5	0	+25.0		FS
2	348	344	-5	-¾			
4	356	342	-4¾	-1½			
6	364	339	-4½	-2½			
*7.2	369	339	-4½	-2¾			
8	368	334	-4½	-2¾	+23.8		
10	367	322	-3¾	-3	+21.1		
12	364	310	-3½	-3½	+18.5		
14	361	298	-2¾	-3¾	+16.3		
16	358	286	-2½	-4	+13.9		
18	354	274	-1¾	-4½	+11.8		
6	342	318	-3¾	-1½	+18.0		
8	349	315	-3½	-2½			
10	355	311	-3½	-3			
12.5	363	307	-3	-4			

* Full throttle heights
CIRCULATION LIST

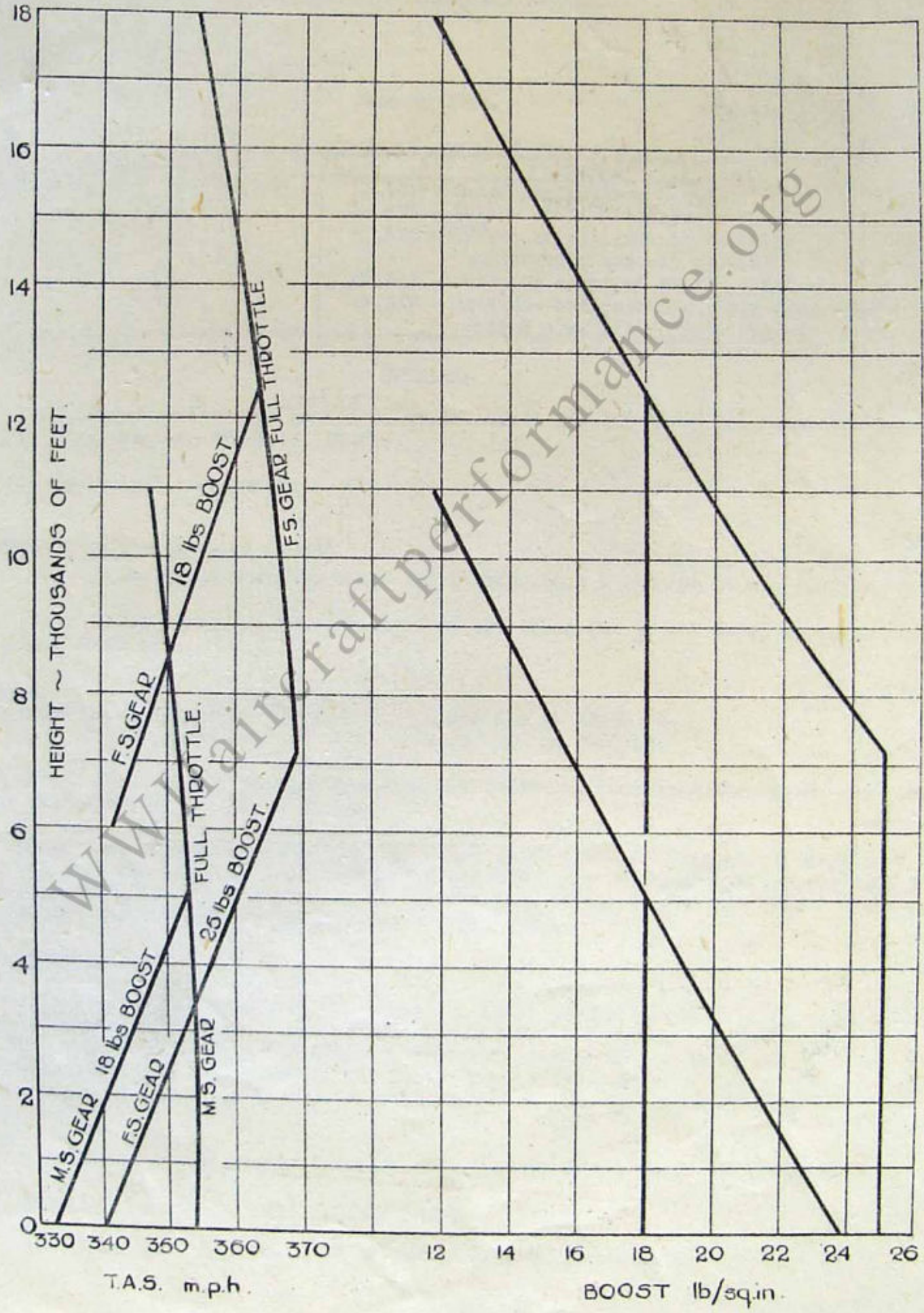
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LEVEL SPEED PERFORMANCE

CORRECTED TO 95% T.O.WT. = 20400 LB

EXT. FUEL TANKS FITTED.

12TH PART OF REPORT N° A.E.A.E.E./767c MOSQUITO MK V HX 809 CURVE N° 6025 TRACE IMP DATE 28 1 44 CHECKED APPROVED



Courtesy Neil Stirling