CONFIDENTIAL 4th Part of Report No. A&AEE/767,m.

AIRCRAFT AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN.

Mosquito NF. Mk.30 MM.748
(2 Merlin 72)

Position error and level speed performance trials.

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 M.A.P.

A&AEE Ref:- 5711,h/33
MAP Ref:- SB.57121/11/RDL1(b)
Date/Period of tests:- Sept. - Dec. 1944.

Progress of issue of report

Report No.	Title
1st Part of A&AEE/767,m	MM.686 - Preliminary handling trials with C.G. at extended aft limit.
2nd do	MM.748 - Weights and loading data
3rd do	MM.748 - Brief handling trials.

SUMMARY

Position error trials, and measurement of the level speed performance under combat and cruising power have been made on Mosquito NF Mk.30 MM.748 at a take-off weight of 21,600 lb., with 2 x 50 gallon under-wing drop tanks fitted.

The position error correction at 20,540 lb. varies non-linearly from +3.5 mph at 150 mph ASI to +8 mph at 180 mph ASI, then linearly to +19.0 mph at 340 mph ASI.

The maximum true level speeds are:-

M.S. Supercharger gear.

Max. cruising power.	Combat power.
340 mph at 17,000 ft.	371 mph at 12,200 ft.

F.S. Supercharger gear.

Max. cruising power.	Combat power
364 mph at 29,500 ft.	397 mph at 24,800 ft.

The performance generally is up to the expected standard for this variant of the Mosquito.

1. Introduction:-

Handling, performance and cooling trials were called for on a representative Mosquito Mk.30 night fighter. The handling is contained in the 3rd Part of this Report, but the cooling trials have since been cancelled.

The results of the position error and level speed performnce trials are contained in this Part of the Report.

2. Condition of aircraft relevant to tests:-

2.1 General:- The salient features of the aircraft were:-

4 x 20 mm guns under fuselage. Muzzles sealed, ejection chutes open.
Type 90 aerial below nose of fuselage.
Twin A.I. aerials near wing tips.
Mast aerial above fuselage.
2 x 50 gallon under-wing drop tanks
Bulbous nose housing special equipment
Individual ejector exhausts with unslotted shroud.
Fuel cooler fitted but blanked off
Fighter type cockpit with flat sided bullet proof windscreen.
Ice guards fitted to engine intakes
Radiator flaps have $2\frac{1}{8}$" gap when in the closed position.

A 4 view photograph is contained in the 3rd Part of this Report. /2.2

2.2 Loading. The tests were made at a take-off weight of 21,600 lb. with the centre of gravity position at 12.2 inches aft of the datum (undercarriage down). This is representative of the typical service load.

2.3 A.S.I. system. The airspeed indicator was connected to the pitot side of the Mk.VIII B (Type 6A/729 - made by Avimo) pressure head mounted on the leading edge of the fin (Fig. 1) and to an R.A.E. type static vent situated on the starboard side of the fuselage nose, (Fig.2).

2.4 Engine details, limitations etc.

2.41 Engines:- The aircraft was fitted with two Merlin 72 engines, Nos.

Port No. 159181/A.446401
Starboard No. 159189/A446405

The operating limitations which were applicable throughout the test were:-

	RPM.	Boost (lb/sq.in.).
Maximum for take-off	3000	+12
" " climb (1 hr. limit)	2850	+12
" for cruising	2650	+7
Combat (5 min. limit)	3000	+18

2.42 Propellers:- De Havilland Hydromatic

Type A5/160; 3 blades, 12 ft. diameter
Port No. NK.66830
Stbd. No. NK.110890.

3. Scope of tests.

(a) Measurement of the position error correction was made in level flight, with flaps and undercarriage up, by the aneroid method over the speed range 160 mph to 300 mph ASI.

(b) Measurement of level speeds were made using both maximum cruising power and combat power in M.S. supercharger gear from 5,000 ft. to 20,000 ft. and in F.S. supercharger gear from 17,000 ft. to 32,000 ft. The radiator exit duct flaps were in the fully closed position throughout.

4. Results of tests.

The position error correction is given for an aircraft weight of 20,540 lbs i.e. 95% of take-off weight.

The level speed measurements have been corrected to ICAN standard atmospheric conditions and to 95% of the take-off weight by the methods of report No.AAEE/Res/170, using a supercharger constant of C = 0.002. The compressibility correction used was calculated by the methods of Report No. AAEE/Res/208.

4.1 Position error correction. The results are given in Fig. 3 whilst the correction to be applied to the altimeter when it is connected to the static side of the ASI system is given for a weight of 20,540 lb. in Fig. 4.

At 20,540 lb. the position error correction is positive and varies non-linearly from +3.5 mph at 150 mph ASI to +8 mph at 180 mph ASI, then linearly to +19.0 mph at 340 mph ASI.

This large position error is probably due to the change of nose shape from the bomber variant.

4.2 Level speeds. The results of the level speed measurements are given in Table I and II and Fig. 5. The performance corrected to 20,540 lb. is summarised below in the form of maximum speeds under the various conditions specified.

/M.S.

M.S. supercharger gear.

Cruising power.	Combat power.
340 mph (TAS) at 17,000 ft.	371 mph (TAS) at 12,200 ft.

F.S. Supercharger gear.

Cruising power.	Combat power.
364 mph (TAS) at 29,500 ft.	397 mph (TAS) at 24,800 ft.

The maximum tip speed Mach number, at full throttle height in F.S. gear, combat power, is 0.91.

5. Comparison with other Mosquito variants.

Compared with the Mosquito PR Mk.XVI DZ.540 (3rd Part of A&AEE/767j) which was a rather cleaner aircraft aerodynamically, having a bomber nose and windscreen and no A.I. aerials, and considering the slight differences in weight, the NF. Mk. 30 version MM.748 is about 15 mph ASI slower in M.S. gear, and 5 to 10 mph ASI slower in F.S. gear up to the full throttle height, above which there is very little difference. Below the full throttle heights the difference in performance seems quite reasonable considering the external conditions of the two aircraft; the fact that the performances become almost the same above the FS gear full throttle height might be attributed to the different exhaust sytem, propellers, etc. cancelling out the variations present at lower altitudes. However, the performance of the NF Mk.30 is, in general, up to the standard which might be expected from this variant.

Circulation List.

C.R.D.
D.T.D.
D.D.T.D.
D.O.R.
D.D.R.D.A.
D.D.R.D.T.
A.D.R.D.T.1.
A.C.A.S(T.R).
D.D.A.P.7.
D.R.A.E. 6 copies
R.D.T.3.
D.D.E.D.
D.D(A)R.D.E.
D.D(E)R.D.E.
C.T.A./D.E.D.
A.D.R.D.E.1.
A.D.R.D.E.2.
R.D.E./T.R.
A.D.R.D.L.1. 2 copies (1 for action)
A.D.D.A.N.A.
A.F.E.E.
R.D.Inst.2.
R.D.Inst.7.
R.D.Nav.
T.F.2.
Chief Overseer
C.I.Accidents
R.D.T.Accidents
D.P.A.
O.C.Handling Sqdn.
R.T.P(TIB) 6 copies + 1
R.T.P.2.a. 50 copies
RTO. de Havillands 2 copies
RTO. Rolls-Royce,Derby. 4 copies
RTO. " " Hucknall 2 copies

Table I.

Maximum Cruising Speeds.
Rad. flaps shut. Corrected to 20,540 lb.

Height ft.	TAS mph	ASI mph	Corrections mph. P.E.	C.E.	R.P.M.	Mean Boost lb/sq.in.	S/C gear.
0	269	257	+13.2	-0.7	2650	+7	M.S.
2,000	277	257	+13.2	-0.9			
4,000	286	258	+13.3	-1.3			
6,000	295	258	+13.3	-1.7			
8,000	303	257	+13.2	-2.1			
10,000	311	256	+13.2	-2.4			
12,000	320	256	+13.2	-2.8			
14,000	328	255	+13.1	-3.2			
16,000	336	253	+13.0	-3.[illegible]			
17,000 *	340	252	+13.0	-3.8			
18,000	338	247	+12.5	-3.9		+6.3	
20,000	332	234	+11.7	-3.5		+4.8	
22,000	322	220	+10.8	-3.2		+3.4	
16,000	307	232	+11.6	-2.6	2650	+7	F.S.
18,000	316	230	+11.5	-2.9			
20,000	324	229	+11.4	-3.3			
22,000	333	227	+11.3	-3.6			
24,000	341	225	+11.1	-3.9			
26,000	349	223	+11.0	-4.2			
28,000	358	221	+10.8	-4.5			
29,500 *	364	219	+10.7	-4.9			
30,000	361	215	+10.5	-5.0		+6.3	
32,000	345	198	+9.3	-4.2		+4.4	

* Full throttle heights.

Table II.

Combat Speeds.
Rad. flaps shut. Corrected to 20,540 lb.

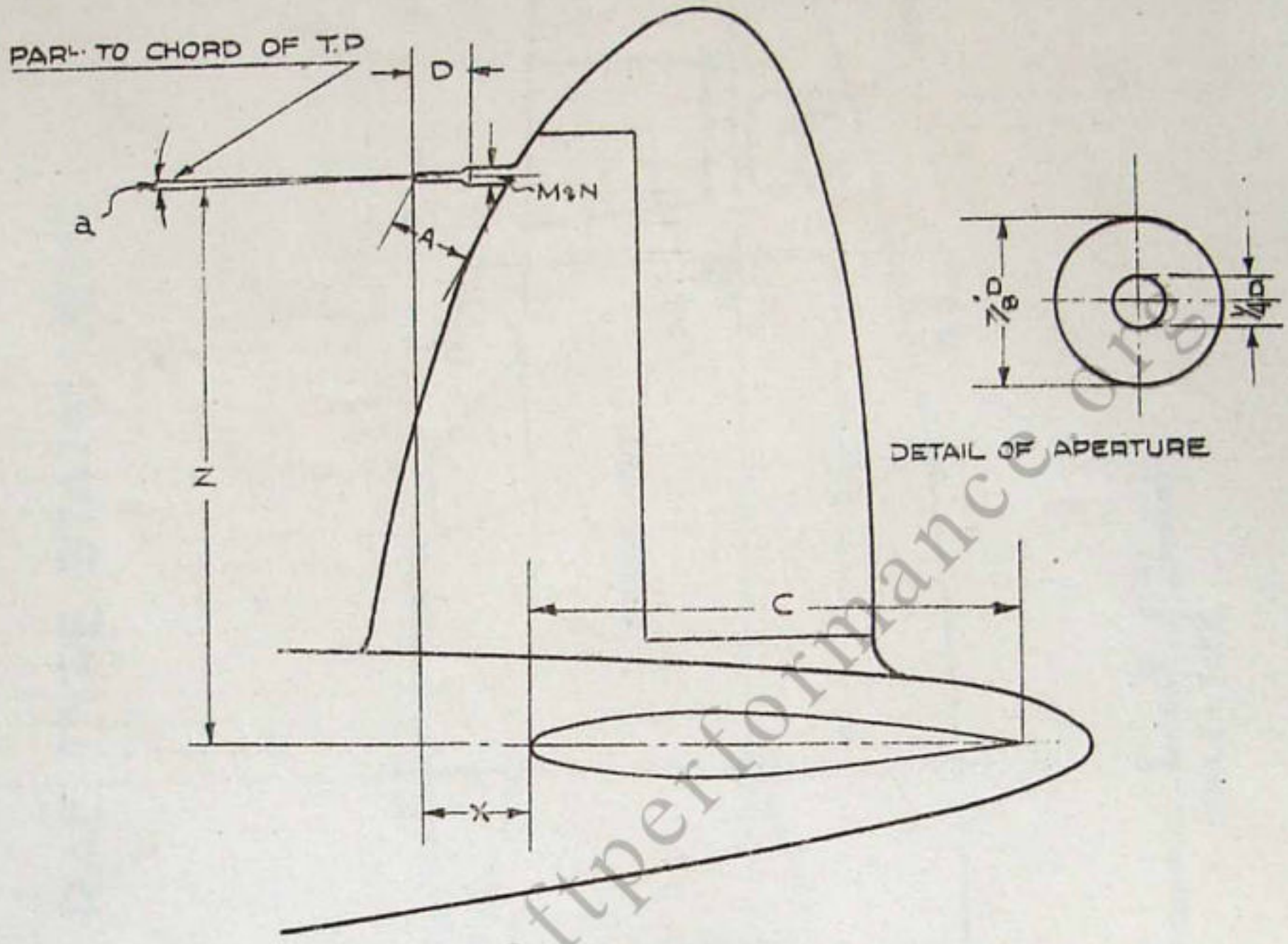
Height ft.	TAS mph	ASI mph	Corrections mph P.E.	C.E.	R.P.M.	Mean Boost lb/sq.in.	S/C gear.
0	314	299	+15.9	-1.2	3,000	+17½	M.S.
2,000	323	299	+15.9	-1.6			
4,000	332	299	+15.9	-2.1			
6,000	342	299	+15.9	-2.6			
8,000	351	299	+15.9	-3.1			
10,000	360	297	+15.8	-3.7			
12,000	369	296	+15.7	-4.3			
12,200 *	371	297	+15.8	-4.3			
14,000	371	289	+15.3	-4.9		+15.4	
16,000	371	279	+14.7	-5.1		+13.1	
18,000	369	270	+14.1	-5.2		+11.0	
20,000	365	258	+13.3	-5.2		+9.0	
22,000	359	246	+12.5	-4.7		+7.1	
16,000	358	270	+14.1	-4.6	3,000	+17½	F.S.
18,000	366	267	+13.9	-5.1			
20,000	375	265	+13.8	-5.4			
22,000	384	263	+13.7	-6.0			
24,000	393	260	+13.5	-6.4			
24,800 *	397	259	+13.4	-6.6			
26,000	396	254	+13.1	-6.6		+15.6	
28,000	392	243	+12.3	-6.3		+12.4	
30,000	387	231	+11.5	-6.2		+10.3	
32,000	378	218	+10.6	-5.5		+8.5	

* Full throttle heights.

FIG. 1

PRESSURE HEAD POSITION

(LEADING EDGE OF FIN)



TYPE OF PRESSURE HEAD Mk. VIII B. (TYPE 6A/729)

RATIO OF APERTURE OF TUBE TO EXTERNAL DIA. OF STATIC TUBE 28·6%

INCIDENCE OF TAIL PLANE (AT ROOT) +0°-35'

ANGLE OF HEAD TO CHORD OF TAIL PLANE -1°-10'

D NOSE OF HEAD TO SUPPORTING STRUT 7"

Z " " " " CHORD LINE OF T.P. 6'-3"

X " " " " T.P. LEADING EDGE (PARALLEL TO CHORD) 14½"

C LENGTH OF CHORD OF T.P. (AT ROOT) 5'-7"

M MAJOR AXIS OF STRUT } 1⅜" DIA.

N MINOR " " "

DISTANCE FROM PLANE OF SYMMETRY NIL

POSITION L/E. OF FIN ON ℄ OF A.C.

SEMI - SPAN 10'-5"

NOSE OF HEAD TO FIN (MIN DISTANCE) 10¼"

PART OF REPORT No. A & A.E.E/767 | MOSQUITO N.F. Mk. 30. M.M. 748 | SKETCH No. 3004 | TRACED. A.A. | DATE 10·3·45 | CHECKED. | APPROVED. | D.D.

4TH PART OF REPORT Nº A.&A.E.E	767 m	MOSQUITO NF 30 MM 748	SKETCH Nº 5003.	TRACED I.M.P.	DATE 11.3.45	CHECKED	APPD

LOCATION OF R.A.E. TYPE STATIC VENT.

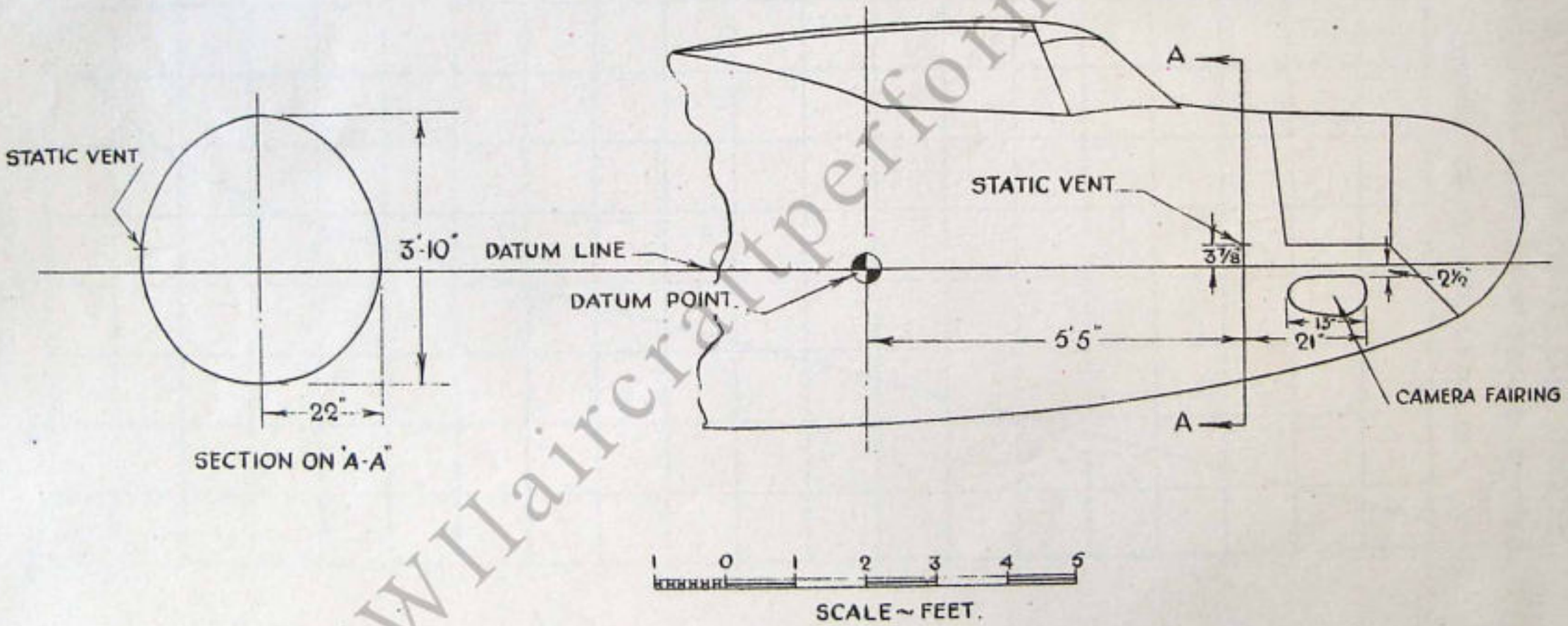


FIG. 2

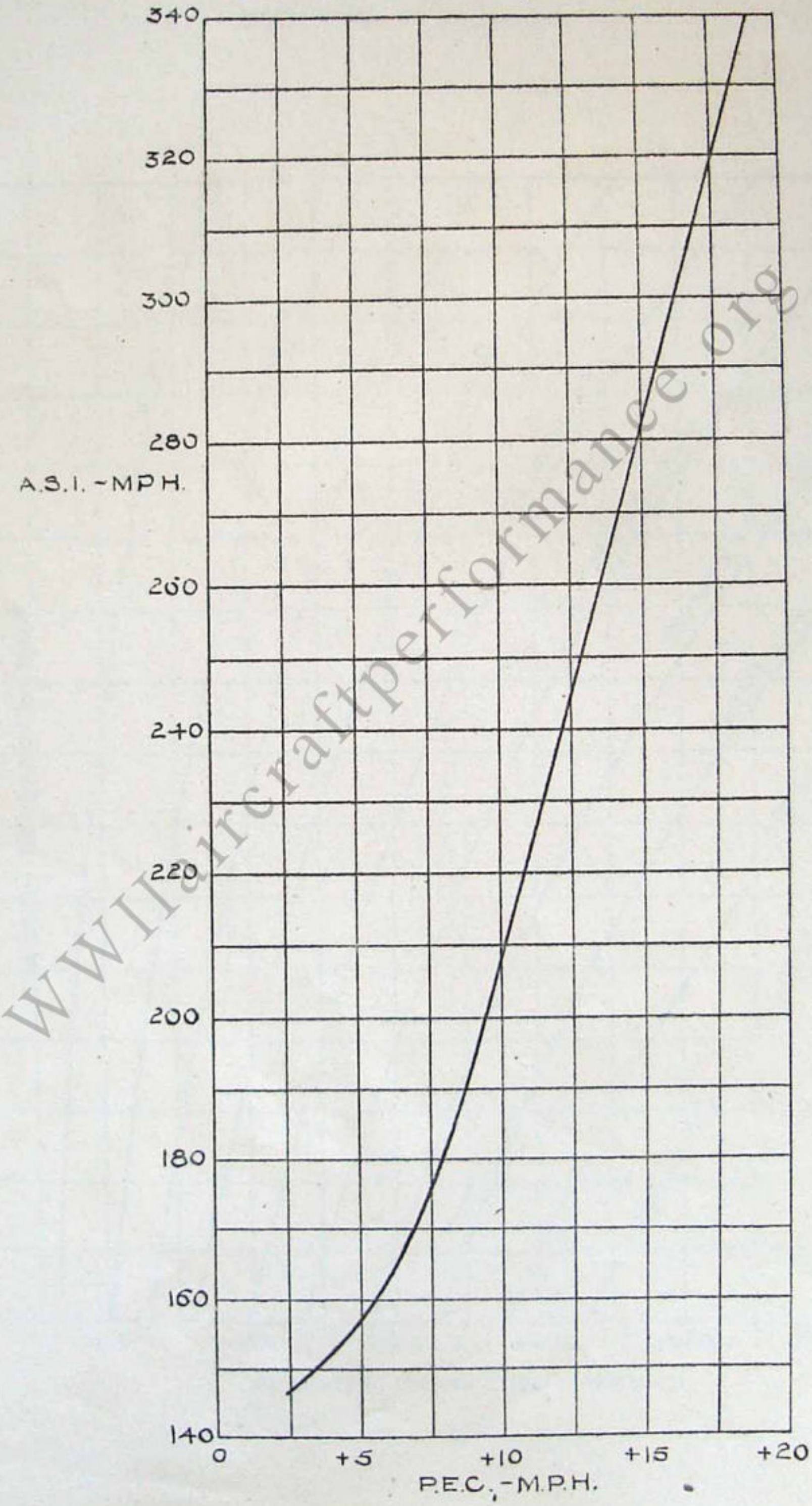
FIG. 3.

POSITION ERROR CORRECTION

R.A.E. STATIC VENT ON NOSE.

50 GALLON WING DROP TANKS FITTED.

CORRECTED TO 20,540 LB.

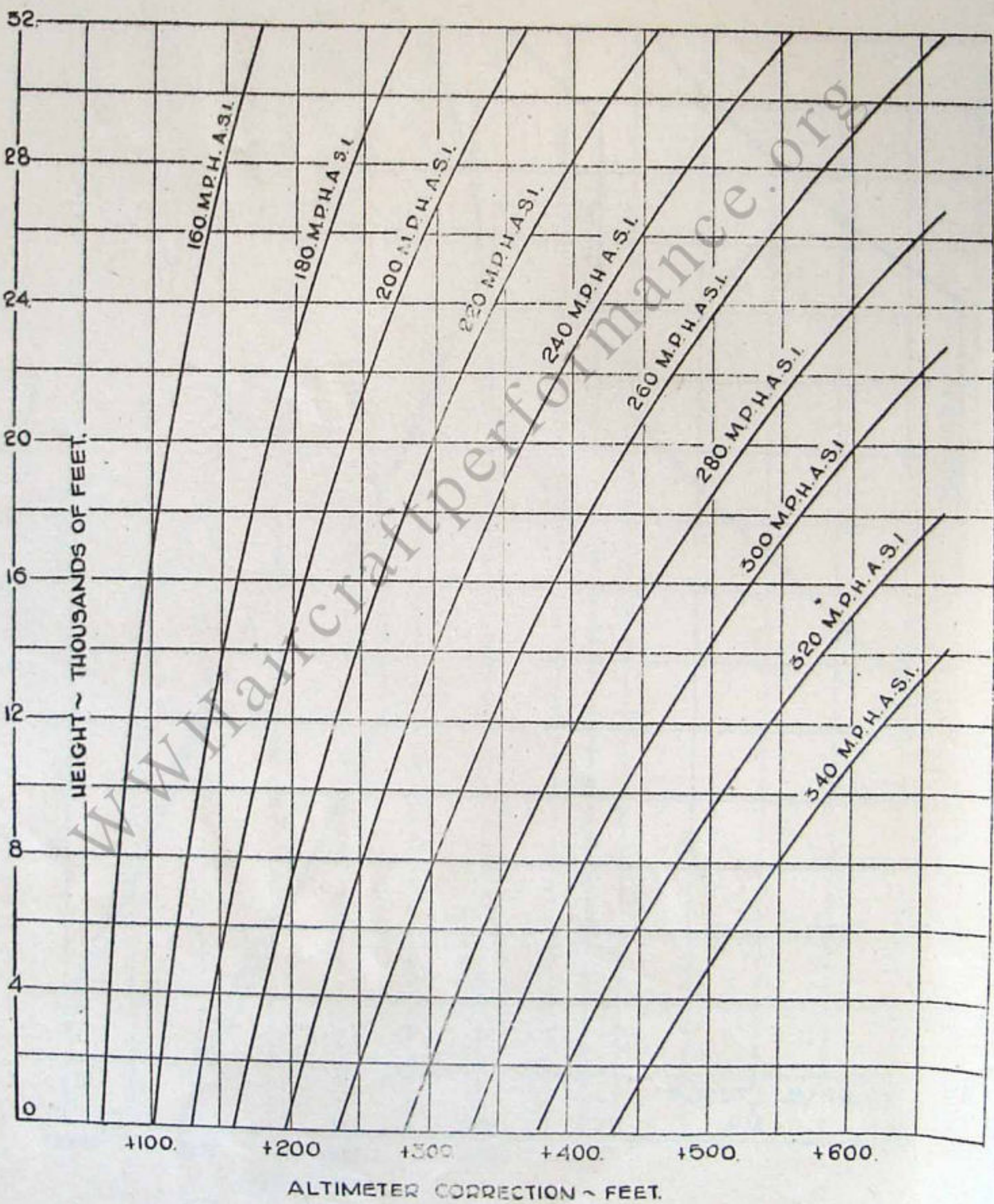


4TH PART OF REPORT Nº A&A.E.E./757m	MOSQUITO NF MK 30 MM 745	CURVE Nº 7052	TRACED - B.M.	DATE - 12·3·45	CHECKED	APPROVED	%

FIG. 4.

STATIC CORRECTION TO ALTIMETER WHEN CONNETED TO STATIC VENT.

CORRECTED TO 20,540 lbs.



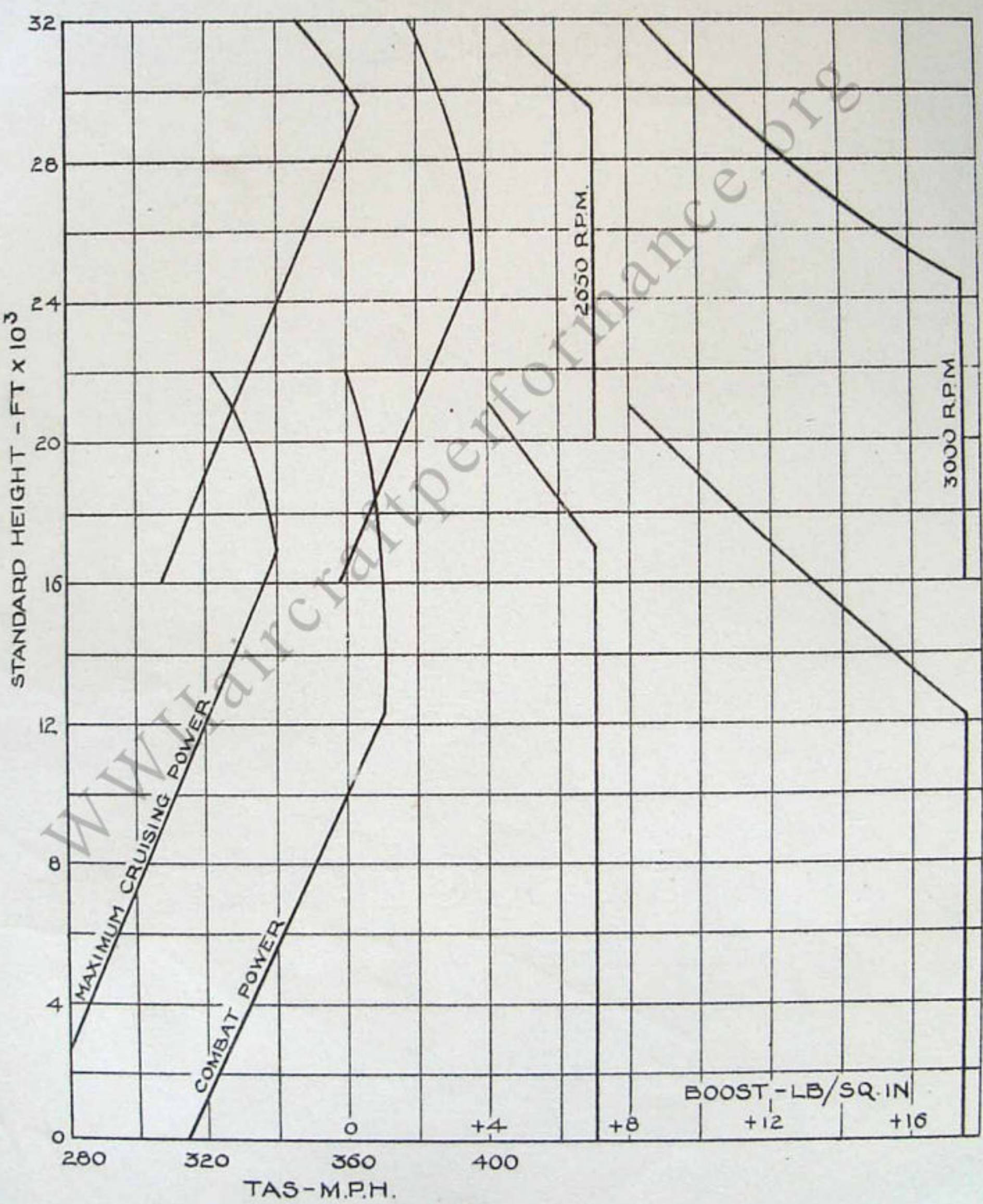
4TH PART OF REPORT NO A&A.E.E/767m. | MOSQUITO N.F 30 M.M.748 | CURVE No. 7053 | TRACED P. DEAR | DATE 10.3.46 | CHECKED J.P.W. | APPROVED. W.G.

FIG. 5

LEVEL SPEED PERFORMANCE.

CORRECTED TO 95% OF T.O.W. VIZ 20,540 LB

RADIATOR EXIT DUCT FLAPS CLOSED



Courtesy Neil Stirling

4TH PART OF REPORT No A&A.E.E/767m | MOSQUITO NF MK 30 MM 748 | CURVE No. 7054 | TRACED - B. MOORE | DATE - 12.3.45 | CHECKED | APPROVED