10th Part of Report No. A.A.E.E./783.

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT.

BOSCOMBE DOWN.

Kittyhawk A.L.229.

(Allison V1710 F.3.R.)

Performance tests with an external fuel tank fitted.

This report deals with 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 & action by the M.A.P.

A.& A.E.E. Ref:- 4481/1-A.S.76/3.
M.A.P. Ref:- R.A.1871/D.E.N.E.1.

Contents of report.

Progress of issue of report.

Report No.	Title.
5th Part of A.& A.E.E/783.	A.K.572 - Weight, Loading Data and Leading particulars.
6th do.	A.K.572 - Fuel consumption trials.
7th do.	A.K.572 & A.L.229 - Radio trials - Communication sets.
8th do.	A.K.572 - Rate of climb and position error measurements.
9th do.	A.L.229 - Fuel consumption trials and range flight with a long range jettisonable ventral tank fitted.

SUMMARY.

Performance measurements were required on Kittyhawk A.L.229, with an external fuel tank fitted. Comparative level speeds were also measured with the tank removed. The tests show:-

Maximum rate of climb = 1530 ft/min. at 12,000 ft.
Time to 20,000 ft. = 15.0 minutes.
Service ceiling = 27,600 feet.
Maximum level speed with tank fitted = 322 m.p.h. at 14,200 ft.
" " " " " removed = 332 m.p.h. at 14,400 ft.

1. Introduction.

Performance measurements were required on a Kittyhawk fitted with an external jettisonable fuel tank. Photographs were attached to the 9th Part of Report No. A.A.E.E./783. This report covers the climb and level speed results obtained. Comparative speeds with the external tank removed were also measured and are given in this report; the climb performance in this condition was not measured. Climb results on a Kittyhawk (A.K.572) without the tank on, have been given in 8th Part of Report No. A.A.E.E./783.

The tests were made between 23/4/42 and 30/4/42.

2. Condition of aeroplane relative to tests made.

Six 0.50 inch calibre wing machine-guns were fitted. For these tests the gun ports were sealed, but the ejection chutes unsealed. A rear view mirror was fitted above the windscreen.

R/T aerials ran from each wing tip to the tail fin. A V.H.F. aerial was fitted on the fuselage behind the pilot's cockpit. I.F.F. aerials were fitted.

The exhausts were individual stub pipes (not flame dampers). A streamline housing for the G.45 camera gun was fitted underneath the

/starboard

starboard wing, just outboard of the undercarriage fairing. The jettisonable fuel tank of 43 Imperial gallons capacity was fitted on a bomb rack under the fuselage. With the tank on, the weight of the aeroplane was 8840 lb. and without it removed, 8485 lb. The propeller was a Curtiss electric type C.5313.S.-D.16 of 11 ft. diameter.

3. Results of Tests:

The results of climb tests are given in Table I and in Figure I and of level speed tests in Tables II and III and in Figure 2. The curve of position error correction for Kittyhawk A.K.572 has been given in 8th Part of Report No.783 and this was used in calculating these speeds, since the pressure head was in the same position and at the same setting on the two aeroplanes.

Partial climb tests were not made. An initial climbing speed of 145 m.p.h. A.S.I. was adopted since this is the speed recommended by R.A.F. pilots in the U.S.A. (Ref. Report C.T.B.- C.19), and was used for the climb test on A.K.572.

The following results are extracted from the tables:-

(i) Climb.
Maximum rate of climb 1530 ft/min. at 12,000 ft.
Time to 10,000 ft. 6.6 mins.
Time to 20,000 ft. 15.0 mins.
Service ceiling. 27,600 ft.
Estimated absolute ceiling 28,700 ft.

(ii) Level speed.
Maximum level speed with external tank fitted, 322 m.p.h. at 14,200 ft.
" " " " " " removed, 332 m.p.h. at 14,400 ft.

4. Discussion of results:

A comparison with the climb results obtained on A.K.572 without the external tank fitted, shows a reduction of rate of climb of 110 ft/min. This is accounted for by the increase of weight (360 lb. due to the external tank and fuel.

In level flight the maximum speed is reduced by 10 m.p.h. T.A.S. with the external tank fitted. Of this, only about ½ to 1 m.p.h. is accounted for by the increase of weight, the remainder being due to the drag of the external tank. The corresponding full throttle height is lowered by 200 feet; this can be accounted for by reduction in ram in the air intake, brought about by the reduced forward speed of the aeroplane.

TABLE I.
PERFORMANCE ON CLIMB.
With external fuel tank fitted and filled.

Standard Height Feet.	Rate of Climb Ft/min.	Time Mins.	T.A.S. m.p.h.	A.S.I. m.p.h.	Position Error Correction m.p.h.	Compressibility correction m.p.h.	R.P.M.	Manifold press. ins. of Hg.	Radiator shutters
0	-	0							
2000	1515	1.3	150.5	145	+0.9	-	2620	36.6	Fully open
4000	1515	2.65	154.5	145	+0.9	-0.1	↓	36.6	↓
6000	1520	3.95	159.5	145	+0.9	-0.1	↓	36.6	↓
8000	1520	5.3	164.5	145	+0.9	-0.2	↓	36.6	↓
10000	1525	6.6	169.5	145	+0.9	-0.3	↓	36.6	↓
12000*	1530	7.9	173.5	144	+0.8	-0.4	↓	36.6	↓
14000	1345	9.3	175	141	+0.5	-0.4	↓	34.1	↓
16000	1165	10.9	176.5	138	+0.2	-0.5	↓	31.7	↓
18000	985	12.75	178	135	-0.2	-0.5	↓	29.1	↓
20000	800	15.0	179.5	132	-0.5	-0.5	↓	27.0	↓
22000	615	17.85	180.5	129	-0.9	-0.6	↓	25.0	↓
24000	435	21.65	182	126	-1.2	-0.7	↓	23.2	↓
26000	250	27.55	183.5	123	-1.6	-0.7	↓	21.6	↓
27000	160	32.5	178	118	-2.2	-0.7	↓	21.0	↓

* Full throttle height. Greatest height reached 27,000 feet.
Service ceiling - 27,600 ft.
Estimated absolute ceiling - 28,700 ft.

TABLE II.

LEVEL SPEED MEASUREMENTS

With external fuel tank fitted and filled

Height in standard atmosphere feet.	Time Air speed. m.p.h.	A.S.I. m.p.h.	Position Error Correction. m.p.h.	Compressibility correction. m.p.h.	R.P.M.	Manifold pressure Inches of Hg.
10,000	306	255.5	+9.2	-1.8	3010	41.5
12,000	313.5	254	+9.1	-2.3	↓	41.5
14,000	321	252.5	+9.0	-2.7		41.5
14,200*	322	252	+9.0	-2.8		41.5
16,000	319	243	+8.6	-2.9		38.6
18,000	313	231.5	+8.0	-3.1		35.7

TABLE III.

LEVEL SPEED MEASUREMENTS.

With external fuel tank removed.

8,000	309.5	266.5	+9.5	-1.6	3010	41.5
10,000	316.5	264.5	+9.5	-2.0	↓	41.5
12,000	323.5	262	+9.4	-2.5		41.5
14,000	330.5	260	+9.3	-3.0		41.5
14,400*	332	259.5	+9.3	-3.1		41.5
16,000	329.5	251	+9.0	-3.2		39.0
18,000	324	239.5	+8.5	-3.3		36.0

* Full throttle height.

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KITTYHAWK AL~229 FIG 1

PERFORMANCE ON CLIMB

WEIGHT ~ 8840 lb.

EXTERNAL FUEL TANK FITTED AND FILLED.

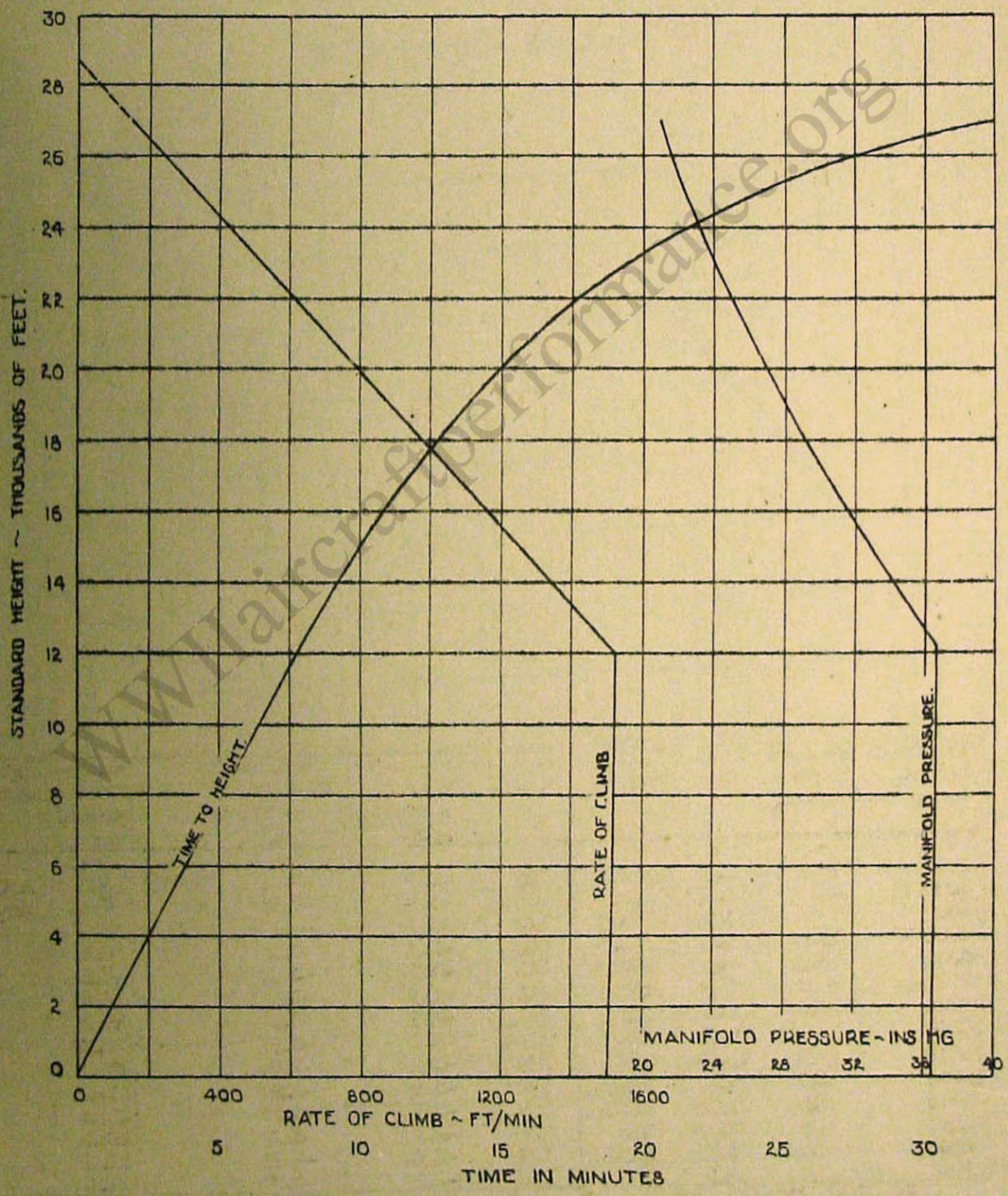

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FIG 2.

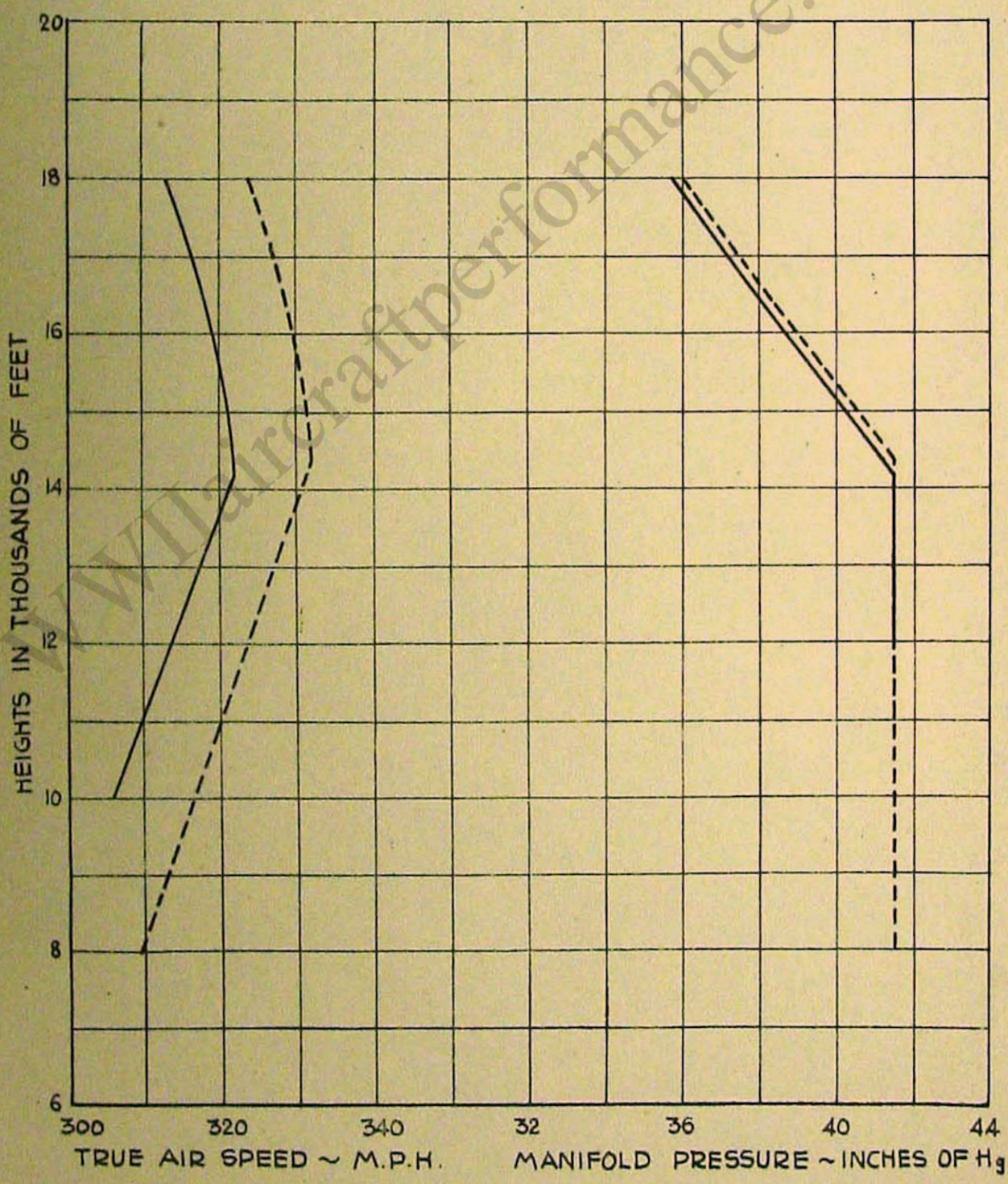
KITTYHAWK A. L.229
LEVEL SPEED PERFORMANCE

a. ———— EXTERNAL FUEL TANK FITTED AND FILLED

b - - - - - - - EXTERNAL TANK REMOVED

a. WEIGHT ~ 8840 lb.

b. WEIGHT ~ 8485 lb.



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