

AD1113/734

RESTRICTED

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

A.T.P. FILE COPY

3 JUN 1942

AEROPLANE AND ARMAMENT EXPERIMENTAL ESTABLISHMENT.

UNCLASSIFIED ^{TS 187463} BOSCOMBE DOWN.
Kittyhawk A. L. 229.
(Allison V1710 F. 3. R.)

Performance tests with an external fuel tank fitted.

A. & A. E. E. Ref:- 4481/1-A. S. 76/3.

M. A. P. Ref:- R. A. 1871/D.

| | | |
|---------------------|---------------|-------------|
| DATE 4/1/53 | | STOCK |
| Contents of report. | | " |
| REDUCE TO | 99 AUTHORIZED | Table. |
| 12 | DATE 5.1.53. | II and III. |

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.I.1.

Performance on climb.
Level speed measurements.
~~Photographs of aeroplane.~~

Figure No.
1
2

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 14,300 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. 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 with 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 $\frac{1}{2}$ 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.

With ex
 Time
 Air
 speed.
 Height in
 standard
 atmosphere
 A.S.I.
 m.

The jettisonable rack under the 6840 lb. and with type C.5313.S.

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.

Circulation List.

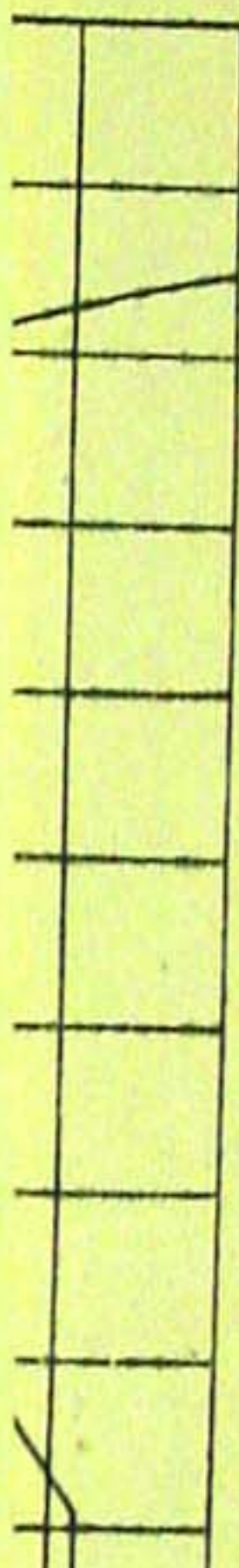
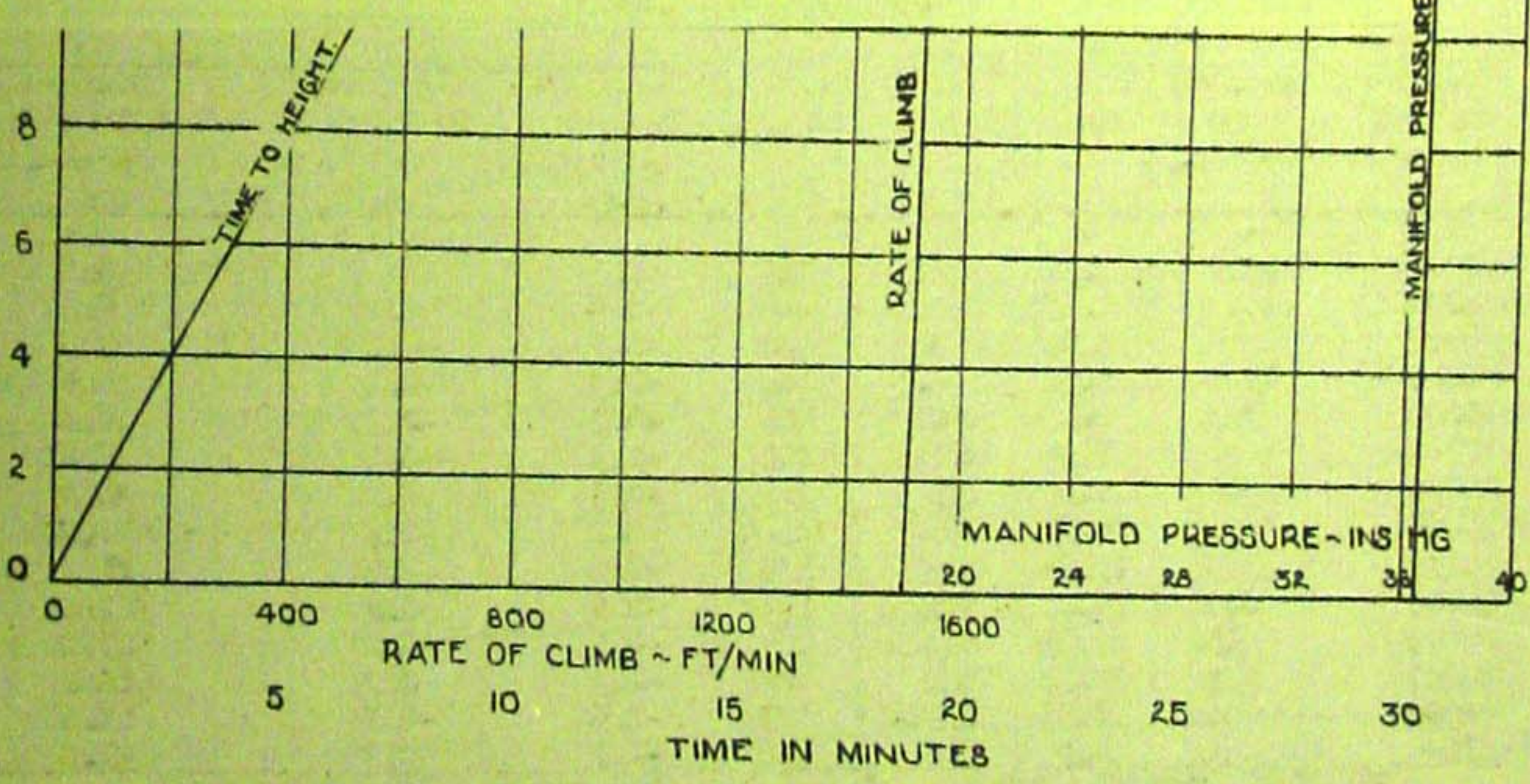
- C. R. D.
- D. C. R. D.
- D. G. A. P.
- D. T. D.
- D. D. T. D.
- D. O. R.
- D. D. R. D. A.
- D. D. R. D. T.
- A. D. R. D. T. 1.
- D. R. A. E. (4 copies)
- R. D. T. 3.
- D. A. D. R. D. E. 4.

- A. D. D. A. N. A.
- C. L. Accidents
- Chief Overseer
- D. P. C. A.
- A. I. 2. (g)
- A. I. 3.
- Western Group Supervisor
- R. D. T. 5. (6 copies)
- R. T. P. 2. (17 + 6 copies)
- R. T. O. Air Service Training (3)

E. J. Jones
Chief Technical Officer.

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

10th PART OF REPORT N° AEAEE/783 CURVE



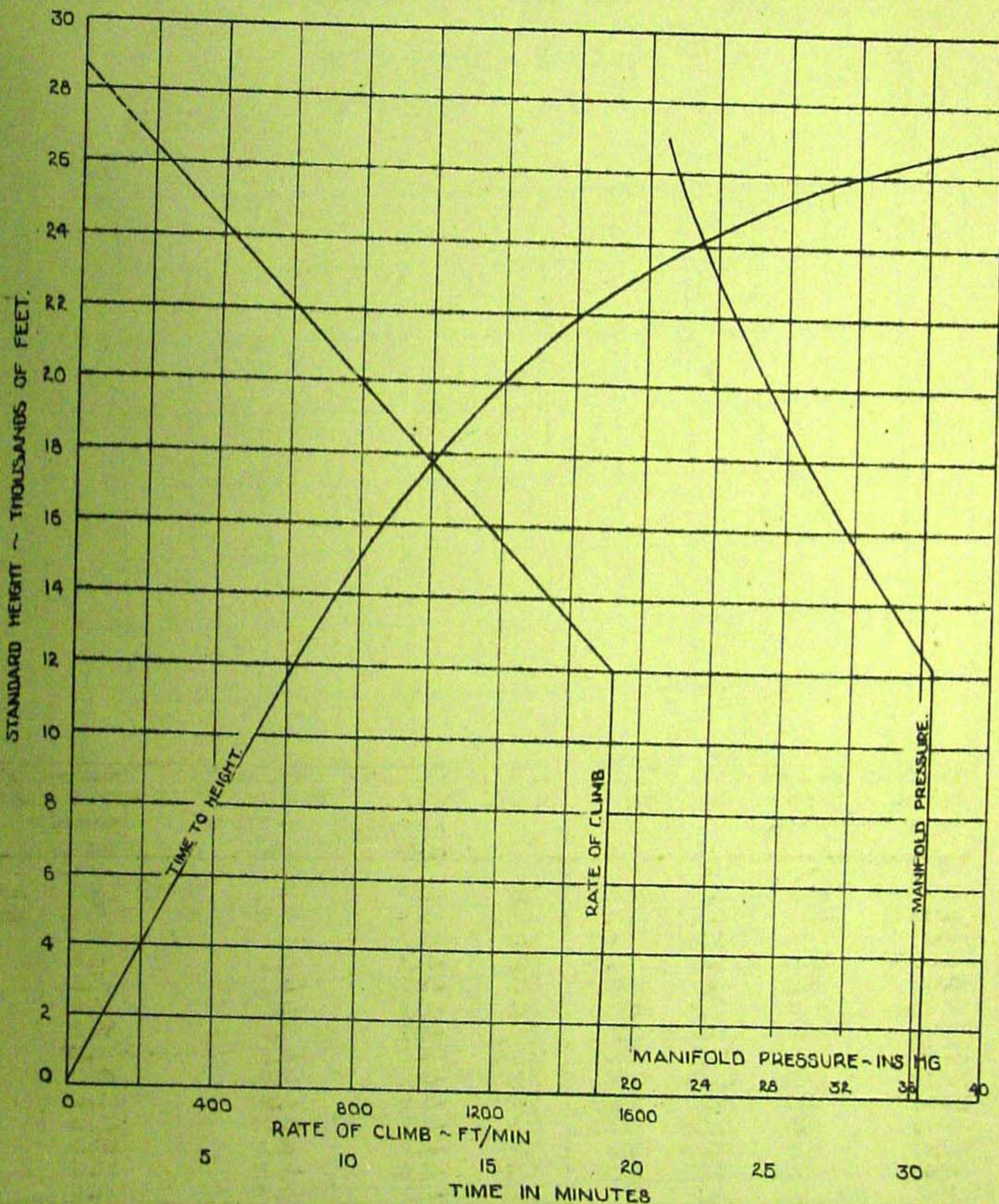
KITTYHAWK ΔL-229

FIG 1

PERFORMANCE ON CLIMB

WEIGHT ~ 8840 lb.

EXTERNAL FUEL TANK FITTED AND FILLED.



10% PART OF REPORT NO A6AEE/783 CURVE NO 4018 TRACED IMP DATE OF TEST 23 & 24/4/42 CHECKED D.O.A. APPROVED S.L.

FIG 2.

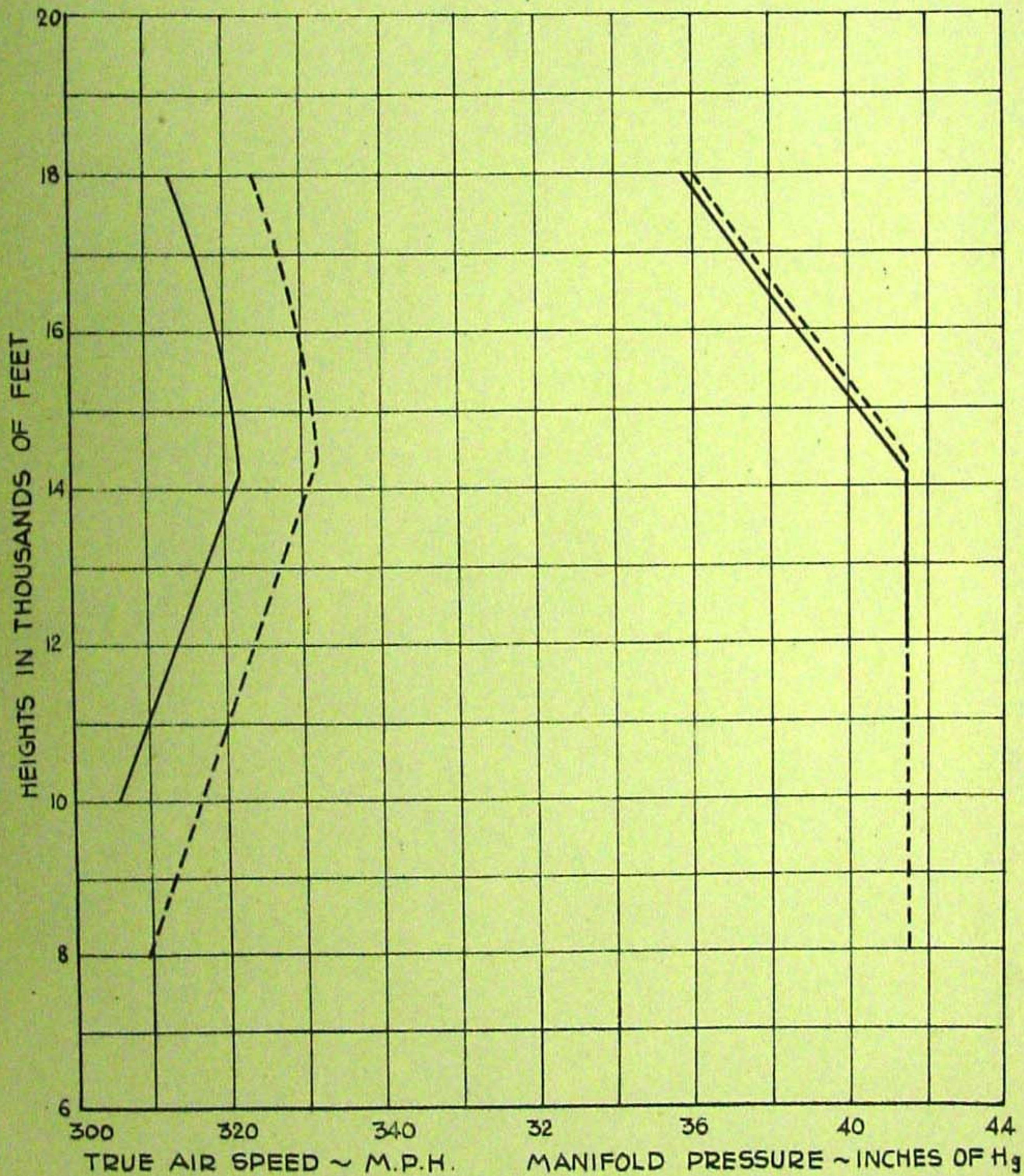
KITTYHAWK A. L. 229

LEVEL SPEED PERFORMANCE

α . ——— EXTERNAL FUEL TANK FITTED AND FILLED
 σ - - - - - EXTERNAL TANK REMOVED

α . WEIGHT ~ 8840 lb.

σ . WEIGHT ~ 8485 lb.



10th PART OF REPORT No A4A.E.E./783 CURVE No 4016 TRACED. E.A. ARNOLD DATE OF TEST APR/42 CHECKED S.O.L. APPROVED