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3rd Part of Report No. A.& A.E.E./767,1.





AIRCRAFT AND ARMAMENT EXPERIMENTAL ESTABLISHMENT
BOSCOMBE DOWN

Mosquito B. Mk. XX KB.328
(2 Merlin 31's)



Level speed performance trials

A.& A.E.E. ref: AM.61/23
M.A.P. ref:- SB.33642/RDL1(b)
Period of tests:- September to December 1948.



Progress of issue of report

| Report No. | Title |
|---|---|
| 1st Part of A.& A.E.E./767,1 | KB.328 - Climb performance trials. |
| 2nd -do- | KB.328 - Position error of static vent. |


## Summary

Level speed performance trials have been completed on this aircraft, a Canadian built version of the B.Mk.IV at a take-off weight of 21430 lb., the loading corresponding to 4-500 lb. bombs in the bomb bay and external fuel tanks beneath the wings.

The principal results are as follow:-

MS gear
Max. all-out speed (+14 lb/sq.in. boost) = 354 mph at 7000 ft.
Max. cruising speed (+7 lb/sq.in. boost) = 332 mph at 11200 ft.

FS gear
Max. all-out speed (+16 lb/sq.in. boost) = 364 mph at 12500 ft.
Max. cruising speed (+7 lb/sq.in. boost) = 345 mph at 17700 ft.

Comparison of the results with those of other Mosquito aircraft fitted with engines of similar power shows that the full throttle heights and performance of KB.328 are rather below average.


## 1. Introduction.

This aircraft is one of the first Canadian built production Mosquito B. Mk.XX aircraft, corresponding to the British B Mk.IV, and performance and handling trials were required.

The position error and climb performance have already been reported in the 1st and 2nd Parts of this Report; level speed measurements were in progress when an engine failure occurred but, owing to the aircraft being required urgently for other work as soon as a replacement was effected the results obtained to date are given in this Part of the Report. The MS gear performance measurements had been completed and in FS gear some check speeds only were required at the time of the engine failure.

## 2. Condition of aircraft relevant to tests.

2.1. General. The following are the chief external features:-

Aerial mast, with three aerials:-
(a) from mast to fin.
(b) from fin to starboard wing.
(c) from mast to port tail plane.
Trailing aerial fairlead.
Ice-guards fitted to air intakes.
Multi-stub ejector exhausts, (5 stubs per bank of cylinders) without flame-damping shrouds.
External fuel tank under each wing; the aircraft originally arrived with metal, Canadian type, tanks, but one of these was damaged during the course of the trials, and replaced by the British wooden type, which differed only slightly in shape and size from the original.

Full particulars of the pitot head and static vent of the airspeed system are given in the 1st Part of the Report.

2.2. Loading. The tests were made at a take-off weight of 21430 lb. with the C.G. at 18.8 ins. aft of the datum point, undercarriage down.

This corresponds to full fuel and oil, 4-500 lb. bombs stowed in the bomb bay and 2-50 gallon (approx.) fuel tanks under the wings.

2.3. Engine details and limitations.

2.31. The aircraft was fitted with Packard built Merlin 31 engines, with Stromberg carburettors; these are the American built version of the Merlin 21. Their numbers were:-

| Port | Stbd |
|---|---|
| A.3837/A.267691 | A.4711/A.324600 |

Propeller reduction gear ratio = 0.42.

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

2.32. The relevant limitations at time of test were:-

| Condition | | RPM | Boost lb/sq.in. |
|---|---|---|---|
| Max. for all-out level (5 mins) | (MS gear) | 3000 | +14 |
| " " " " " " | (FS gear) | 3000 | +16 |
| " " cruising | | 2650 | + 7 |

2.4. Propellers.

De Havilland Hydromatic, 12'1" diameter.
3 blade, metal, type 23 EX-319.

| | Port | Stbd |
|---|---|---|
| Hub serial Nos. | NK.1965 | NK.1825 |

3. Tests made.

3.1. Level speeds were measured at all-out power conditions and at cruising conditions, from ground level to 28000 ft., the particular height ranges being chosen to suit the supercharger gear and engine condition.

4. Results.

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

4.2. Details of results are given in Tables I and II and Figure I. As explained in para. 1 further check measurements in FS gear would have been desirable but the results quoted can be taken as reasonably accurate.

5. Discussion of results.

5.1. Comparison of the results with those of other Mosquitos shows that the full throttle heights of the engines are rather below the average of the corresponding British built engines.

Allowing 1000 ft. in cases where snowguards were fitted, the following table gives the full throttle heights of various aircraft at +9 lb/sq.in. boost, the highest boost at which comparisons can be made.

/Table

| | Aircraft No. | Mark. | Engines | Full throttle height (No snow guards fitted) MS gear | FS gear | Report ref. |
|---|---|---|---|---|---|---|
| 1. | KB.328 | (B) XX | Merlin 31 | 13800 | 20600 | This report |
| 2. | W.4096 | II | " 21 | 14300 | 20700 | 17th Part of AAEE/767,a |
| 3. | KB.106 | XX | " 31 | - | 20600 | BAC, CTB.36 |
| 4. | KB.111 | XX | " 31 | - | 22000 | Communication from Messrs. De Havilland Aircraft Co. |
| 5. | DK.290 | IV | " 21 | 15400 | 21800 | 12th Part of AAEE/767,c |
| 6. | HX.809 | VI | " 25 | 13900 | 20800 | 12th Part of AAEE/767,d |
| 7. | HJ.679 | VI | " 25 | 14400 | 20700 | 7th Part of AAEE/767,e. |

It will thus be seen that individual engines may vary considerably in full throttle height, but KB.328 has the lowest values of all. The top speed of this aircraft at +9 lb/sq.in. boost is about 15 mph lower than that of B.Mk.IV DK.290 after due allowance for weight difference, and differences in external equipment. Of this 15 mph only about 6-8 mph can be accounted for by difference in full throttle heights.

## TABLE I

### All-out level speeds

Rad. flaps shut. Corrected to 20400 lb. 3000 rpm.

| Height ft | TAS mph | ASI mph | Corrections mph P.E. | C.E. | Mean boost lb/sq.in. | S/C gear |
|---|---|---|---|---|---|---|
| 0 | 324 | 323 | +1 | 0 | +14.0 | MS |
| 2000 | 332 | 322 | +1 | -½ | | |
| 4000 | 341 | 321 | +1 | -1¼ | | |
| 6000 | 349 | 320 | +1 | -1½ | | |
| * 7000 | 354 | 319 | +1 | -2 | | |
| 8000 | 354 | 315 | +1 | -2½ | +13.1 | |
| 10000 | 353 | 305 | +1¼ | -2¾ | +11.2 | |
| 12000 | 350 | 293 | +1¼ | -3 | + 9.6 | |
| 14000 | 347 | 281 | +1½ | -3¼ | + 8.0 | |
| 16000 | 342 | 269 | +1½ | -3½ | + 6.5 | |
| 18000 | 336 | 256 | +1½ | -3½ | + 5.0 | |
| 8000 | 343 | 305 | +1 | -2 | +16.0 | FS |
| 10000 | 352 | 304 | +1 | -2¾ | " | |
| *12500 | 364 | 303 | +1 | -3½ | " | |
| 14000 | 363 | 295 | +1½ | -3¾ | +14.5 | |
| 16000 | 361 | 284 | +1½ | -4 | +12.3 | |
| 18000 | 357 | 272 | +1½ | -4 | +10.3 | |
| 20000 | 352 | 260 | +1½ | -4¼ | + 8.6 | |
| 22000 | 345 | 246 | +1½ | -4 | + 6.9 | |
| 24000 | 336 | 231 | +1¾ | -3¾ | + 5.2 | |
| 26000 | 327 | 217 | +2 | -3½ | + 3.8 | |
| 28000 | 317 | 202 | +2 | -3¼ | + 2.2 | |

* Full throttle heights.

/Table II

TABLE II

**Maximum cruising speeds**

Rad. flaps shut. Corrected to 20400 lb. 2650 rpm.

| Height ft | TAS mph | ASI mph | Corrections mph P.E. | Corrections mph C.E. | Mean boost lb/sq.in. | S/C gear |
|---|---|---|---|---|---|---|
| 0 | 286 | 285 | +1½ | 0 | +6.8 | MS |
| 2000 | 294 | 285 | +1½ | - ¼ | | |
| 4000 | 302 | 284 | +1½ | - ½ | | |
| 6000 | 310 | 284 | +1½ | -1¼ | | |
| 8000 | 318 | 282 | +1½ | -1¾ | | |
| 10000 | 327 | 282 | +1½ | -2¼ | | |
| *11200 | 332 | 281 | +1½ | -2½ | | |
| 12000 | 331 | 277 | +1½ | -2¾ | +6.2 | |
| 14000 | 328 | 266 | +1½ | -2¾ | +4.9 | |
| 16000 | 325 | 255 | +1½ | -3 | +3.6 | |
| 18000 | 320 | 243 | +1½ | -3 | +2.2 | |
| 20000 | 314 | 230 | +1½ | -3 | +0.9 | |
| 12000 | 315 | 263 | +1½ | -2¼ | +6.8 | FS |
| 14000 | 325 | 263 | +1½ | -2½ | | |
| 16000 | 336 | 264 | +1½ | -3¼ | | |
| *17700 | 345 | 264 | +1½ | -3¾ | | |
| 20000 | 339 | 250 | +1½ | -3¾ | +5.0 | |
| 22000 | 333 | 238 | +1¾ | -3½ | +3.6 | |
| 24000 | 325 | 223 | +1¾ | -3½ | +2.2 | |
| 26000 | 316 | 209 | +2 | -3¼ | +0.9 | |
| 28000 | 306 | 195 | +2¼ | -3 | -0.3 | |

* Full throttle heights.

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1/an Actin

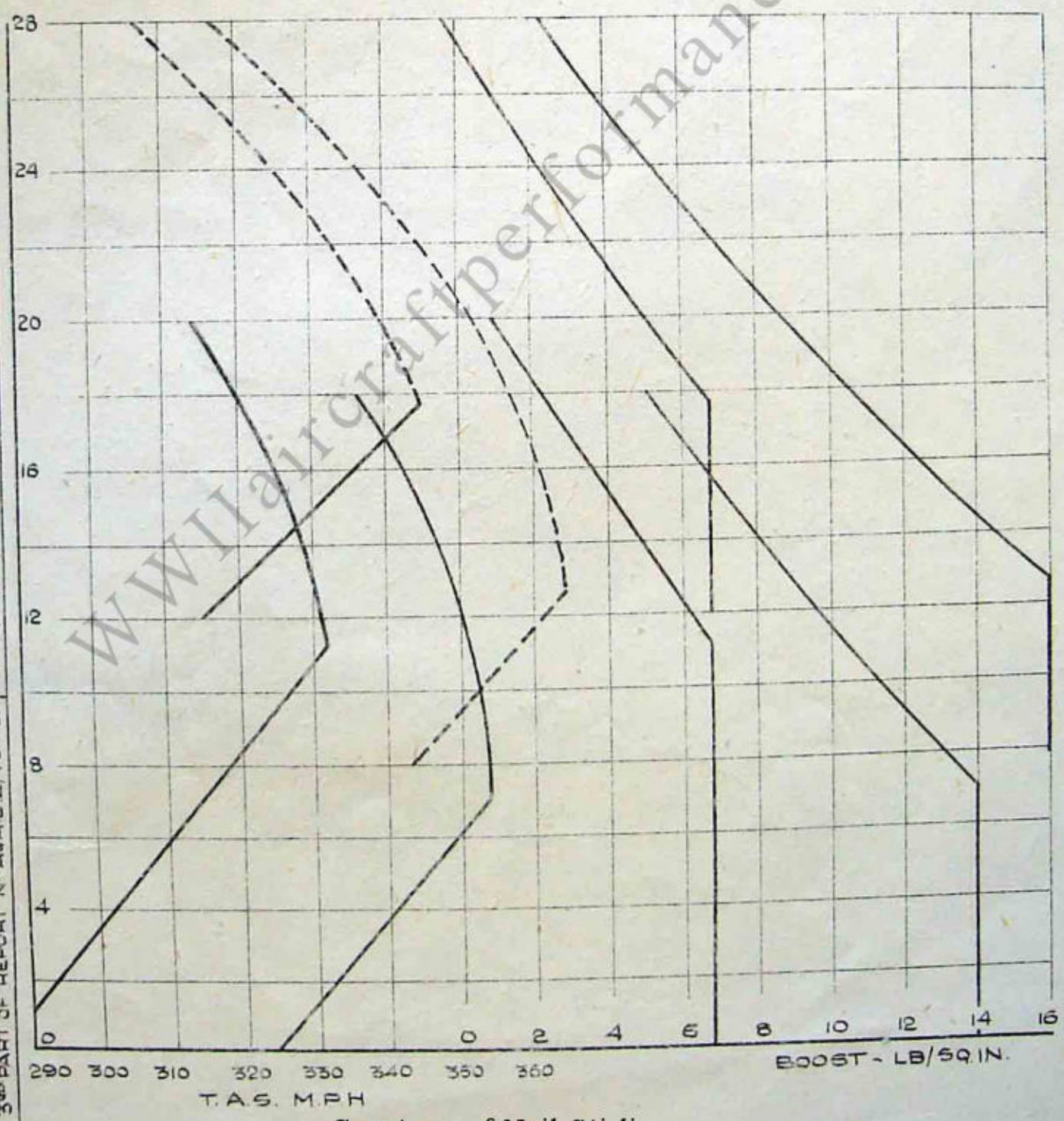
FIG. 1.

# LEVEL SPEED PERFORMANCE

CORRECTED TO 95% T.O. Wt. = 20,400 LB.

EXTERNAL WING FUEL TANKS FITTED.

– – – – – – – LEVEL SPEEDS NOT FULLY CHECKED.




3rd PART OF REPORT No. A&AEE/767L. | MOSQUITO XX K.B. 328 | CURVE No. 6117. | TRACED. A.A. | DATE. 27.2.44. | CHECKED | APP.