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WAR DEPARTMENT

AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON

Pursuit 1-Engine (P-36A), A.C. No. 38-180 RLF-BC

Date May 16, 1941

SUBJECT: Propeller Tests

SECTION Flying Branch

SERIAL No. PHQ-M-19-1245-A

Contract No.

Expenditure Order No. 587-1-84

Purchase Order No.

A. Purpose

1. Propeller tests using a torque meter on the P-36A airplane equipped with R-1830-17 engine and 3-bladed, constant speed propeller, blade design No. 89306-22S. Flown with full gas and oil load. Wheels up, wing flaps neutral, carburetor cold, mixture automatic, radio antenna in place, synchronized gun openings covered.

B. Test Results

1. High speed tests, cowl flaps closed:

Altitude Ft.	R.P.M.	True Speed MPH	Torque Meter BHP	Throttle
5000	2550	280	1045	Part
10,000	2550	292.5	1000	Wide
15,000	2550	290.5	845	Wide
20,000	2550	287	700	Wide
25,000	2550	279	560	Wide

2. Climb data, cowl flaps wide open:

Altitude Ft.	Rate of Climb Ft/Min	R.P.M.	Torque Meter BHP	True Speed MPH
10,000	2600	2550	945	150
15,000	1960	2550	780	155
20,000	1365	2550	645	160
25,000	840	2550	550	166

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3. Level flight at 5000 ft. density altitude, corresponding pressure altitude 4919 ft., cowl flaps closed:

True Speed MPH	R.P.M.	Man. Press. "Hg.	Carb. Air Temp. °C.	BHP from Power Curves	BHP from Torque Meter	Time from Take-Off Min.
278	2550	38.9	12	1028	1016	-
273	2550	36.9	12	968	960	-
266.5	2550	35	12	907	894	-
260	2550	32.9	11	844	836	-
252.5	2550	30.9	11	777	768	-
279	2600	38.9	12	-	1027	-
277	2700	37.9	12	-	1009	-
276.5	2800	37.9	11	-	1012	-

4. Level flight at 5000 ft. density altitude, corresponding pressure altitude 5797 ft., cowl flaps closed:

118	1350	20.1	0	-	202	10
135.5	1350	21.1	-1	-	231	13
156	1350	22.1	-1	-	262	15
180.5	1350	25.0	-1	-	341	19
196.5	1400	26.9	0	-	393	22
231	1750	30.9	0	-	595	26
252	1950	34	+1	-	752	30
260	2150	34	+1	-	810	32
273.5	2350	36.9	+1	-	952	35
281	2550	38.9	+1	-	1056	39
261	2650	31.9	0	-	846	42

5. Level flight at 10,000 ft. density altitude, corresponding pressure altitude 9730 ft., cowl flaps closed:

293	2550	38	+4	1015	1007	-
288	2550	36	+3	958	953	-
281	2550	34	+3	892	890	-
275	2550	31.9	+3	825	827	-
268	2550	29.9	+3	758	774	-
285.5	2600	34.5	+3	-	916	-
283	2700	34.5	+3	-	926	-
283	2800	34.5	+3	-	935	-

6. Level flight at 15,000 ft. density altitude, corresponding pressure altitude 14,564 ft., cowl flaps closed:

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True Speed MPH	R.P.M.	Man. Press. "Hg.	Carb. Air Temp. °C.	BHP from Power Curves	BHP from Torque Meter	Time from Take-Off Min.
291	2550	31.9	-5	841	850	-
285	2550	29.9	-5	775	812	-
278.5	2550	27.9	-4	719	744	-
270.5	2550	25.9	-4	658	678	-
260.5	2550	24	-4	590	620	-
283	2600	28.9	-5	-	783	-
282.5	2700	28.9	-5	-	796	-
281.5	2800	28.9	-6	-	793	-

7. Level flight at 20,000 ft. density altitude, corresponding pressure altitude 19,360 ft., cowl flaps closed:

289	2550	26	-12	672	714	-
278	2550	24	-12	615	642	-
267	2550	22	-12	553	578	-
254.5	2550	20.1	-13	496	510	-
237	2550	18.2	-13	433	448	-
276	2600	23.5	-12	-	628	-
277	2700	23.5	-12	-	613	-
275.5	2800	23.5	-12	-	592	-

8. Level flight at 25,000 ft. density altitude, corresponding pressure altitude 24,105 ft., cowl flaps closed:

272	2550	20.1	-19	505	532	-
258.5	2550	18.2	-19	447	463	-
235.5	2550	16.3	-19	-	395	-
209	2550	14.3	-20	-	320	-
263	2600	19.2	-20	-	504	-
261.5	2700	19.2	-20	-	507	-
261.5	2800	19.2	-20	-	517	-

9. Level flight at 25,000 ft. density altitude, corresponding pressure altitude 24,670 ft., cowl flaps closed:

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True Speed MPH	R.P.M.	Man. Press. "Hg.	Carb. Air Temp. °C.	BHP from Power Curves	BHP from Torque Meter	Time from Take-Off Min.
205	1850	15.3	-22	-	281	83
229	2050	16.3	-23	-	339	79
244	2200	17.2	-23	-	380	76
258.5	2550	18.2	-23	-	466	74
286.5	2500	22	-24	568	592	54
288	2550	22.1	-23	573	607	60
289	2600	22.3	-23	-	626	65
291.5	2650	22.6	-23	-	639	69
293.5	2700	23	-23	-	651	72

10. The torque meter horsepowers during climb may possibly be in error at the higher altitudes due to oil congealing in the lines at the colder temperatures. However, the torque meter was reworked to prevent oil congealing in the lines for all level flight tests at and above 15,000 ft., and, therefore, the torque meter horsepower figures should be reliable in level flights.

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