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ARMY AIR FORCES
MATERIEL ~~ADMINISTRATIVE~~ COMMAND

MEMORANDUM REPORT ON

WAB/mac/47

B-26B-10 Airplane, AAF No. 41-18199

Date 31 December 1943

SUBJECT: Comparative Propeller Performance Tests

SECTION Flight

SERIAL No. Eng-47-1675-A

Contract No.
Expenditure Order No. 587-96
Purchase Order No.A. Purpose

1. To report results of comparative performance tests run on the B-26B-10 airplane, AAF No. 41-18199, at Wright Field using the following propellers, each assembled in Curtiss controllable hubs, design No. C 543S:

(a) Curtiss Propeller Division, four bladed, constant speed, full feathering propellers, blade design No. 824-303-18, normal blade angle range 18.0 degrees to 48.0 degrees at 54 inch radius.

(b) American Propeller Corporation, four bladed, constant speed, full feathering propellers, blade design No. C3821306, normal blade angle range 18.6 degrees to 42.9 degrees at 54 inch radius.

B. Factual Data

1. Airplane was equipped with two Pratt and Whitney R-2800-43 engines with two speed blowers. Tests were conducted at a take-off gross weight of 33,000 pounds, c.g. at 18.57% m.a.c., wheels up.

Airplane was flown with landing gear retracted, wing flaps neutral, loop housing and radio antennae in place and deicer boots installed; oil cooler shutters and cowl flaps in specified position. Top turret in place with two fifty caliber guns pointing rearward and elevated approximately forty degrees; two fifty caliber guns in the tail pointing rearward; two fifty caliber guns each in streamlined blisters on both lower sides of the fuselage pointing forward with the muzzles even with the propeller arcs; a single fifty caliber gun in the lower right section of the nose pointing forward; a single fifty caliber gun in the center of the nose pointing approximately thirty-five degrees to the right; and a standard external torpedo rack under the fuselage aft of the loop housing.

Chart power data was obtained from Pratt and Whitney Aircraft R-2800-25HC engine power curves Nos. INST 1684-1 and -2 dated 4 December 1942 and 30 October 1942 respectively and revised 18 March 1943.

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2. High speeds at 5000 feet at military power in low blower at a gross weight of 31,000 pounds; 2700 r.p.m. and wide open throttles; mixture automatic rich.

Manifold Pressure "Hg.	BHP per engine from Power Chart	True Speed, MPH		Cowl Flap Position	Oil Cooler Shutter Position
		Curtiss Prop. Blade Design No. 814-303-18	American Prop. Blade Design No. C3821306		
47.5	1880	277.5	272.5	*Half Open	*Wide Open

* NOTE: It was necessary to fly with these settings to keep engine cooling within limits on the day on which the tests were run. Additional tests were run with the Curtiss propellers, with the cowl flaps neutral and the oil cooler shutters closed; although the engine operating temperatures were exceeded, an increase of five and one half MPH in true speed at 5000 feet was obtained at 2700 RPM and 47.5 inches of manifold pressure and 1880 BHP per engine.

3. Power calibration at 5000 feet with Curtiss propeller blade design No. 814-303-18; cowl flaps one-half open; oil cooler shutters wide open; mixture as noted.

RPM	Manifold Pressure "Hg.	Automatic Mixture Setting	BHP/Engine from power chart	True Speed MPH	Estimated Gross Weight Pounds
2390	41.8	Rich	1595	264	31,150
2380	41.8	Rich	1590	268	30,300
2350	39.4	Rich	1475	257.5	30,900
2250	36.7	Rich	1325	246.5	30,760
2100	34.2	Rich	1200	237.5	30,700
1900	30.7	Lean	860	200	30,500
1790	29.7	Lean	765	182	30,620
1790	28.6	Lean	720	169	30,560

NOTE: It was necessary to run tests with cowl flaps one half open and oil cooler shutters wide open to obtain proper cooling on the day on which the test was run.

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4. Power calibration at 5000 feet with the American propeller blade design No. C3821306; cowl flaps one-half open; oil cooler shutters wide open; mixture as noted.

RPM	Manifold Pressure "Hg.	Automatic Mixture Setting	BHP/Engine from power chart	True Speed MPH	Estimated Gross Weight Pounds
2600	46.7	Rich	1845	270.5	31,720
2550	46.1	Rich	1820	269.5	31,520
2400	44.7	Rich	1665	265	31,400
2350	38.3	Rich	1425	247	31,280
2250	35.8	Rich	1280	235	31,180
2100	34.3	Rich	1160	227	31,100
1895	29.9	Lean	810	187.5	31,040
1795	28.9	Lean	735	169	30,960
1795	27.8	Lean	690	162.5	30,800

NOTE: It was necessary to run tests with cowl flaps one-half open and oil cooler shutters wide open to obtain proper cooling on the day on which the tests were run.

C. Conclusions

1. With the American Propeller Corporation blades, design No. C3821306, the airplane was 5 m.p.h. slower at high speed at 5000 feet and through the maximum cruising range than with the Curtiss Propeller Division blades, design No. 811-303-18.

At the approximate cruising speed for maximum range with the American blades the airplane was about 3 m.p.h. slower, while at minimum cruise conditions airplane speeds are the same for both propellers for all practical purposes.

Summary curves for a gross weight of 31,000 pounds are included on page A-2.

2. A series of wide open throttle runs at various engine r.p.m.s at 5000 feet with the American blades showed an increase of only 7.5 m.p.h. in the true speed of the airplane by increasing the engine speed from 2400 r.p.m. to 2700 r.p.m. Brake horsepower figures were obtained from engine power curves. Therefore, it is impossible to say whether the indicated increase in power of 225 BHP per engine from 2400 r.p.m. to 2700 r.p.m. was actually obtained or if the unusually small increase in speed with r.p.m. is due to a loss of propeller efficiency.

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3. It would be desirable on all tests of this nature to have the engines equipped with torquemeters so that a more accurate determination of power could be made.

D. Recommendations

1. None

N.A.P.
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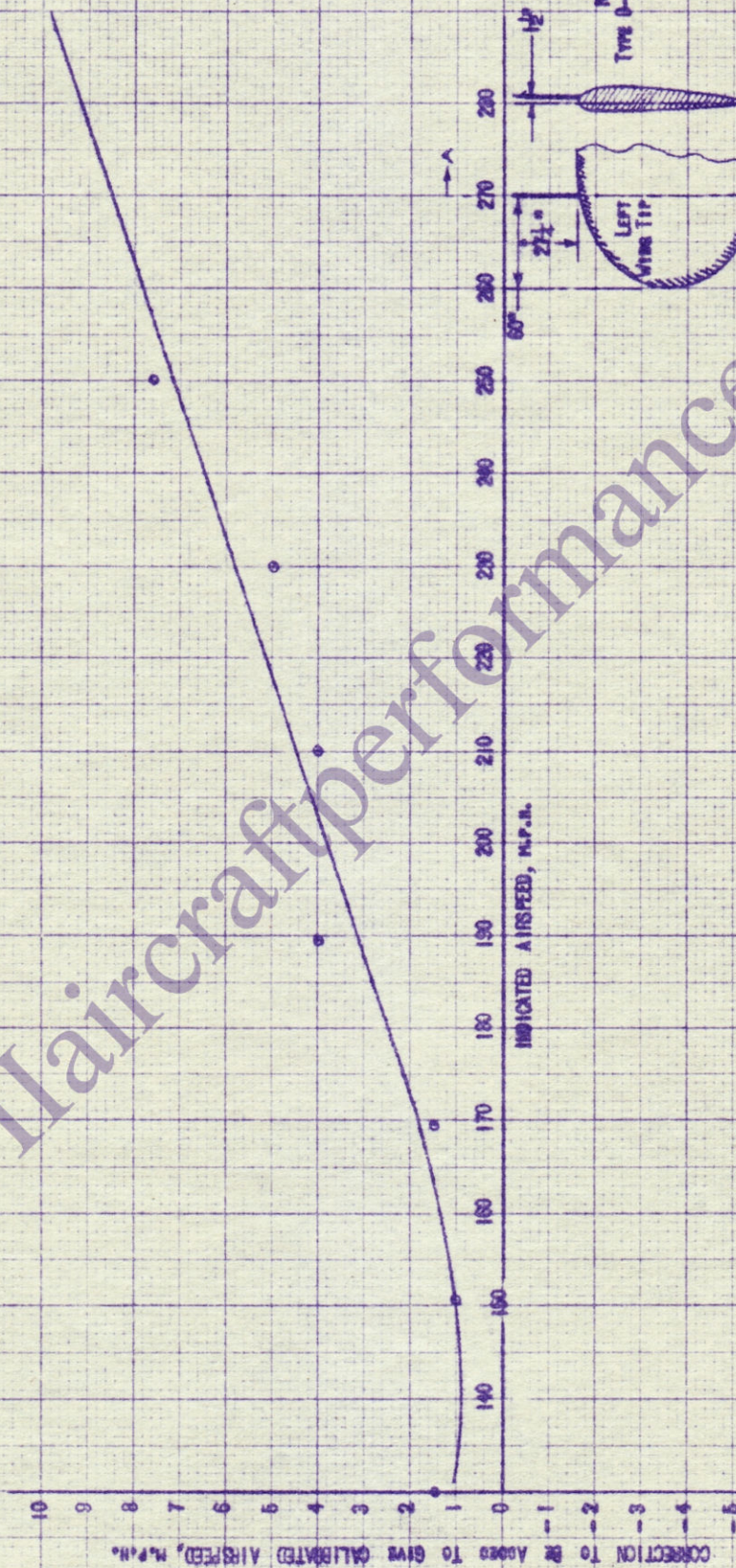
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7 DECEMBER 1948



8-25 8-18, AAF No. 41-18199
AIRSPEED CALIBRATION

MEMO REPORT NO. ENG-47-165-A
7 DECEMBER 1948

8-26 B-10, AAF No. 41-18192

(C) CURTIS PROPELLER (BLADE DESIGN NO. 814-823-16)
(A) JENSEN PROPELLER (BLADE DESIGN NO. 63821305)

COOL FLAPS ONE-HALF OPEN
OIL COOLER SHUTTERS WIDE OPEN
GROSS WEIGHT = 31,000 POUNDS

