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ARMY AIR FORCES

~~MATERIEL COMMAND~~ TSCEP5E/DL/djw/2-6275

HEADQUARTERS, AIR TECHNICAL SERVICE COMMAND

MEMORANDUM REPORT ON

B-26F-1-MA, AAF No. 42-96231

Date 20 January 1945

SUBJECT: Comparative propeller tests on the B-26F Airplane, AAF No. 42-96231

SECTION Flight

Contract No.
Expenditure Order No. 354-580-270
Purchase Order No.

SERIAL No. TSCEP5E-1829

A. Purpose

To report results of comparative performance tests run on the B-26F-1-MA airplane, AAF No. 42-96231, at Wright Field, using the following propellers, each assembled in Curtiss controllable hubs:

(a) American Propeller Corporation, four bladed, constant speed, full feathering propellers, blade design No. C-3821306, normal blade angle range 16.0 degrees to 46.0 degrees at 54 inch radius.

(b) Curtiss Propeller Division, four bladed, constant speed, full feathering propellers, blade design No. 814-3C3-18, normal blade angle range 17.0 degrees to 48.0 degrees at 54 inch radius.

B. Factual Data

1. This test was run at the request of the Propeller Laboratory, Engineering Division, in order to determine the relative efficiency of the two types of blades. Due to the very limited time that the airplane was available for these tests, it was requested that none of the instruments except the torquemeter gages be calibrated. A complete performance test had been run on this airplane in June 1944 and reported in Memorandum Report No. Eng-47-1754-A. None of the instruments in the airplane had been changed since June 1944, and both the airspeed and temperature calibrations obtained at that time were used for the present test. The tests run were entirely comparative in nature and absolute values presented have not been corrected for instrument errors.

The airplane was equipped with 2 Pratt and Whitney R-2800-43 engines with torque noses installed on each engine. The airplane is a standard B-26F, unpainted, and all armament including package guns in place.

The pilot on all flights was Captain Jarrell B. Wilkinson, Bomber Flight Test Branch, Flight Section.

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2. Take-off gross weight for the 5600 foot power calibrations and for light weight single-engine ceiling was 33,380 pounds, c.g. at 18.38% MAC. Take-off gross weight for heavier weight single-engine sinking speed determination was 32,600 pounds.

3. Power calibration at 5,600 feet (Fig. 2) with American propeller blades, design No. C-3821306. Configuration: wheels retracted, wing flaps neutral, cowl flaps flush, oil cooler flaps closed, low blower.

Average RPM	Mixture	Test Torque BHP	True Speed	Instant Gross Weight
2670	Rich	1750	285	32,670
2390	Rich	1520	274	32,300
2200	Rich	1405	271	32,150
2100	Rich	1340	264	31,655
2100	Rich	1163	248	31,535
2100	Lean	995	228.5	31,455
1900	Lean	820	207	31,255
1800	Lean	752	196	31,175
1700	Lean	660	175.5	31,120
1700	Lean	590	149	31,070

* 4. Power calibration at 5,600 feet with Curtiss propeller blade, design No. 814-303-18. Configuration: Same as paragraph 3.

R.P.M.	Mixture	Torque BHP	True Speed	Gross Weight
2670	Rich	1745	288.3	32,630
2400	Rich	1550	280	32,380
2195	Rich	1415	273	32,250
2100	Rich	1340	268.1	32,010
2100	Rich	1198	254.7	31,880
2095	Lean	1022	234.5	31,770
1900	Lean	839	210.6	31,695
1803	Lean	775	200.3	31,625
1700	Lean	670	177	31,530
1710	Lean	618	164	31,490

* The right torquemeter gage did not function well at high powers during this test due to a leak in the line. Previously both torquemeters had been reading within five pounds per square inch of each other. In the calculations for the first five points, the torquemeter reading on the left engine was assumed to be the average of both engines.

5. Single Engine Ceiling of the airplane was determined by a drift down from 8,000 feet until level flight could be maintained for at least 10 minutes.

Configuration for these tests with both sets of propeller blades was as follows: Right engine dead, propeller feathered, cowl flaps closed; left engine operating at 2400 RPM, wide open throttle in low blower, cowl flaps wide open, and oil cooler shutters 10° open.

(a) American propeller blades. Single engine ceiling with this installation was 7500 feet at a gross weight of 30,400 pounds. The approximate rate of descent with American blades at the beginning of the drift down was approximately 70 feet per minute steadily decreasing until the airplane was able to maintain level flight after 13 minutes.

(b) Single engine ceiling with Curtiss Propeller blades was 6700 feet at a gross weight of 30,800 pounds. The apparent rate of descent at the beginning of the drift down was 50 feet per minute decreasing until the airplane was able to maintain level flight after 23 minutes.

6. Single engine rate of descent with Curtiss Propeller blades at a gross weight of 31,900 pounds at 7,000 feet was 110 feet per minute. The airplane was flown with the following configuration: left engine dead, propeller feathered, left cowl flaps closed; right engine operating at 2400 RPM, wide open throttle in low blower, with cowl flaps wide open and oil cooler shutters 10° open.

Standard Brake Horsepower for single engine performance at 7,000 feet was taken as 1450 BHP as determined in Memorandum Report No. Eng-47-1754-A. From further single engine data in the above mentioned report, the rate of descent with American blades installed was 155 feet per minute at 7000 feet and 31,200 lbs. gross weight.

C. Conclusions

1. With Curtiss Propeller Division Blades, the airplane was four miles per hour faster than with the American Propeller Corporation Blades above 270 MPH true airspeed.

From 270 MPH to 210 MPH the airplane with Curtiss blades was from 3 MPH to 1/2 MPH faster than it was with American blades. Below 200 MPH there was no difference in airspeed for the same brake horsepower.

2. With either blades installed at 2400 RPM and 2700 RPM there appears to be a loss of efficiency, as a large increase in brake horsepower resulted in a small increase in speed.

3. Single engine ceiling with Curtiss blades was 6700 feet at a gross weight of 30,800 pounds. Single engine ceiling with American blades was 7500 feet at a gross weight of 30,400 pounds. The difference in single engine ceiling caused by the use of different propeller blades is too small to conclude from flight tests that one set of blades is more efficient than the other.

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4. Rate of descent at 7000 feet at a gross weight of 31,900 pounds with Curtiss blades installed is 110 feet per minute.

From Memorandum Report No. Eng-47-1754-A, rate of descent at 7000 feet at a gross weight of 31,200 pounds with American blades was 155 feet per minute.

D. Recommendations

None. Results merely forwarded.

Prepared by DANIEL LEIVICK, Cpl., A.C.
Engineer, Flight Test Engrg.,
and Research Branch

Attached:
Appendix A

Flown by JARRELL B. WILKINSON, Capt., A.C.
Pilot, Bomber Flight Test Branch

Approved by LEONARD F. HARMAN, Col., A.C.
Chief, Flight Section

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Flight Test Engineering & Research Branch
Memorandum Report No. TSCEP5E-1829
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APPENDIX A

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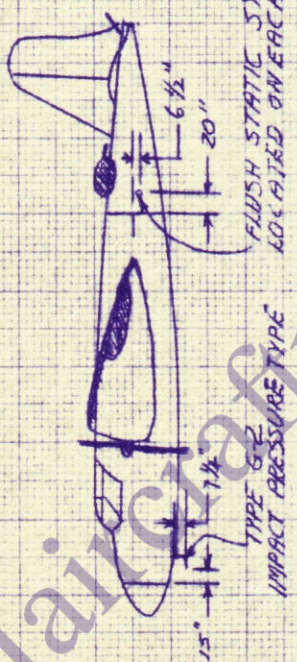
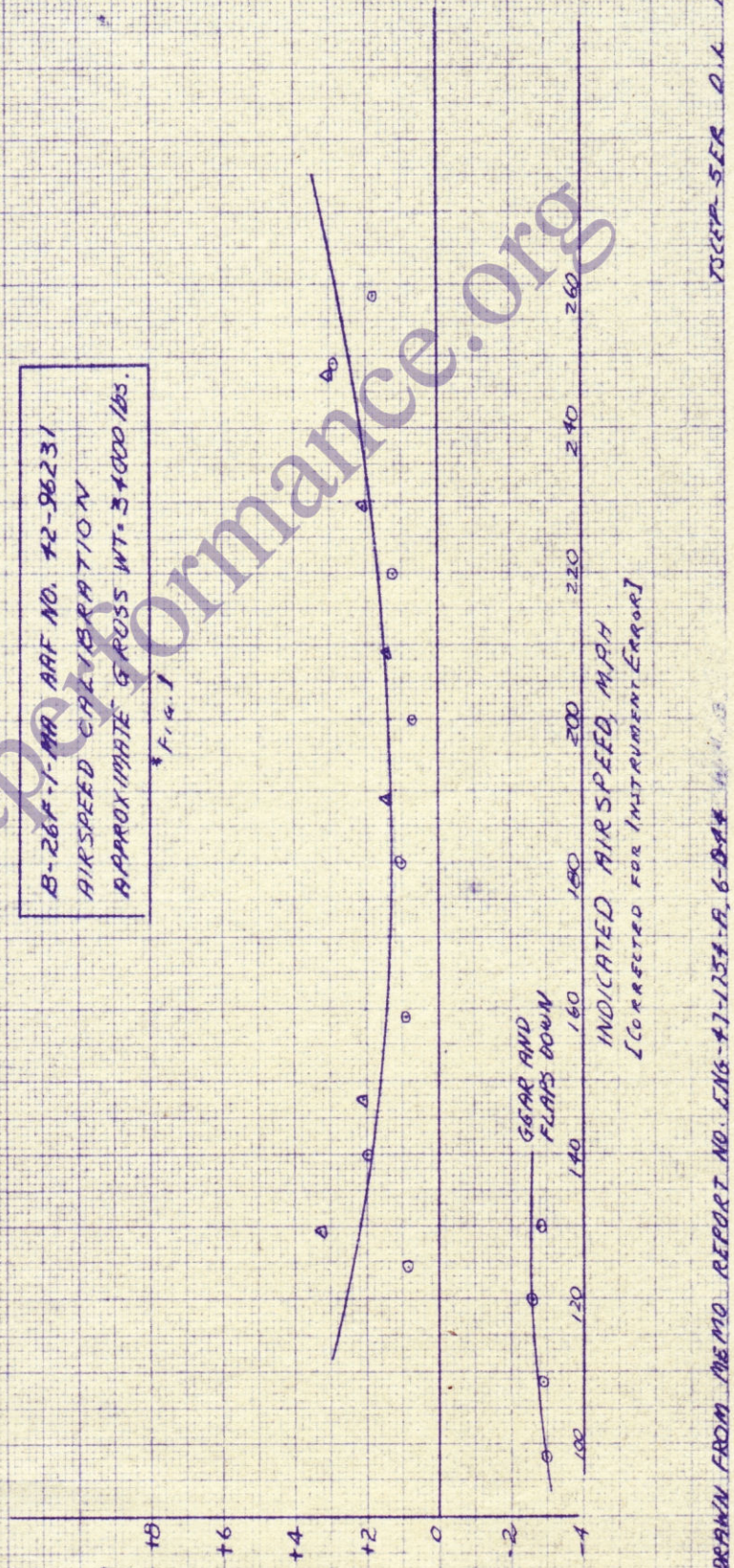


B-26F-1-MA AAF NO. 42-96231
AIRSPEED CALIBRATION
APPROXIMATE GROSS WT. 34,000 LBS.

* Fig. 1



* REDRAWN FROM MEMO REPORT NO. ENG-41-1351-A, 6-8-41

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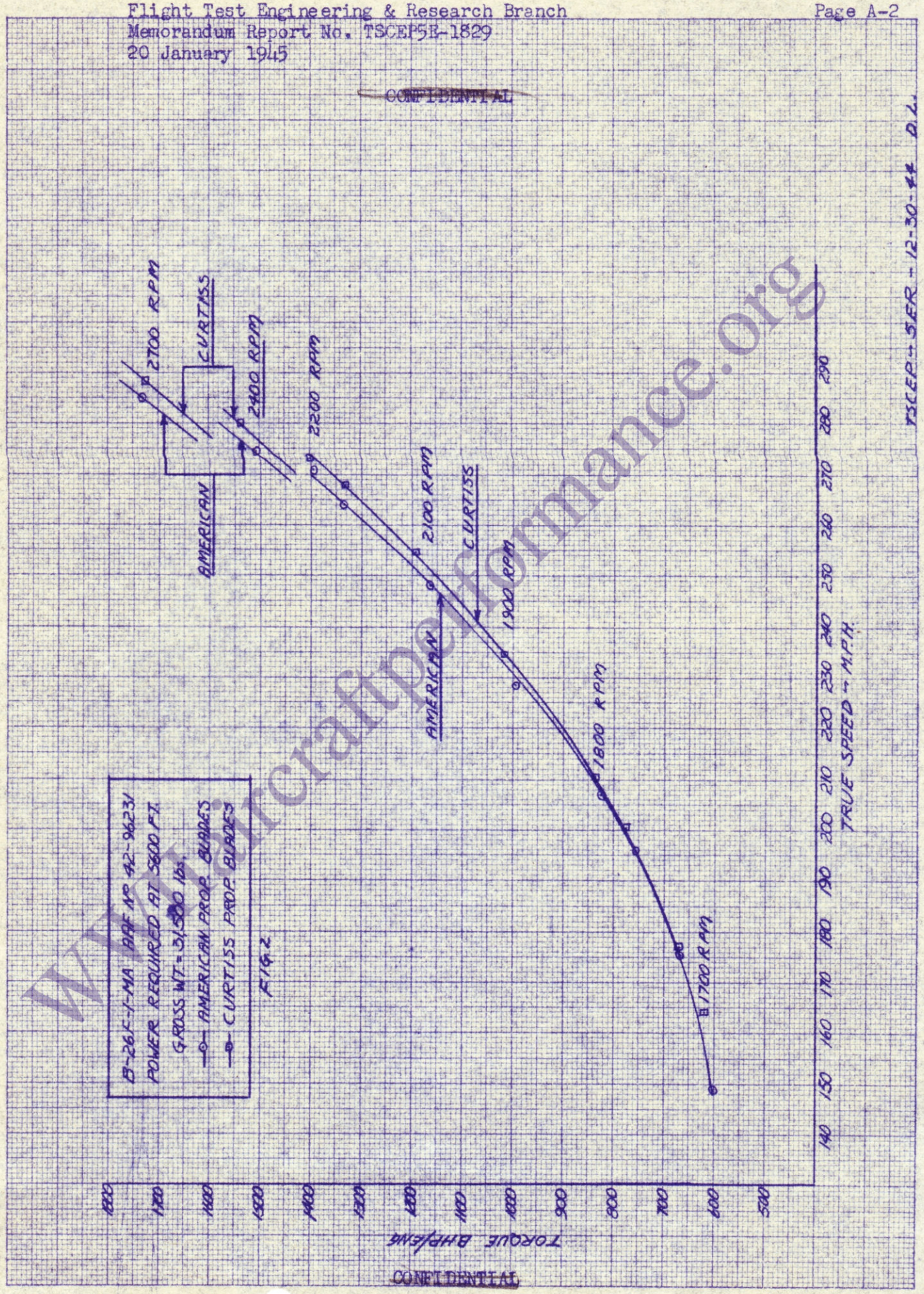

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