MEMORANDUM REPORT ON
P-47D-10RE Airplane, AAF No. L-2-75035

SUBJECT: Comparative Propeller Tests

SECTION Flight

Classification changed to CLASSIFIED
by authority of CG, AMC

SERIAL No. Eng-47-174-A

CLASSIFIED

A. Purpose

To report results of comparative propeller flight tests run at manufacturer's plant, Farmingdale, Long Island, New York.

B. Factual Data

1. Airplane equipped with Pratt & Whitney R-2800-63 engine with water injection equipment; A-17 turbo regulator installed for 2300 horsepower tests, A-13 turbo regulator for 2600 horsepower tests.

2. All performance is given at the same horsepower as that obtained on similar tests on the same airplane with the Standard Curtiss 712-102-12 propeller installed. Results of this test were reported in Memorandum Report No. Eng-47-1652-A.

3. All level flight tests were run with cowl flaps closed, intercooler and oil cooler flaps neutral, throttle wide open, engine RPM 2700, and mixture auto-rich. All climb tests run with cowl flaps wide open, intercooler and oil cooler flaps wide open, throttle wide open, engine RPM 2700, and mixture auto-rich.

4. Airplane was ballasted to simulate the following conditions:

- Six .50 caliber guns; 300 rounds of ammunition per gun; 305 gallons of gasoline; 15 gallons of water; 14 pounds pyrotechnics. In this condition the weight was 13,260 lbs. with the Curtiss 836-202-18 propeller, and 13,365 lbs. with the Hamilton standard 6507A-2 propeller. C.G. location at 13,260 lbs. was 29.63 percent M.A.C.

5. The following propeller configurations and type of tests were run:

- A. Curtiss 836-202-18 propeller with standard cuffs and finish, no vent holes: High Speed vs altitude curve is given in Fig. 4 and Rate of Climb vs altitude curve is given in Fig. 7.

- B. Hamilton standard 6507A-2, regular production type propeller: High speed vs altitude curve is given in Fig. 3 and Rate of Climb vs altitude curve is given in Fig. 6.
G. Curtiss 836-2C2-18 with standard cuffs and tip vent holes: 24,000 foot speed vs power data given in Fig. 5. Climbs from 13,000 ft. to 31,000 ft. given in Fig. 7.

D. Curtiss 836-262-18 with standard cuffs and vent holes: 5,200 ft. and 24,000 ft. speed vs power data given on the faired curves in Fig. 5. These speed power curves were run as a base for cuff comparison tests.

E. Curtiss 836-2C2-18 with Curtiss "C" type cuffs, penetrate finish, and vent holes: 5200 ft. and 24,000 ft. speed vs power data given in Fig. 5.

F. Curtiss 836-2C2-18 with Curtiss "D" type cuffs, flattened blade shank, penetrate finish, and vent holes: 24,000 ft. speed vs power data given in Fig. 5.

6. The location of the airspeed head and the position correction is given in Fig. 1.

C. Conclusion

Climb performance of Curtiss 836-2C2-18 propeller and Hamilton Standard 6507A-2 propeller was nearly identical, the difference between the two being within the limits of experimental accuracy. A definite difference of performance in level flight high speeds was found, with the Hamilton Standard propeller giving from five to eight miles per hour faster speeds throughout the altitude range tested.

Results of tests on Curtiss 836-2C2-18 with standard cuffs and tip vent holes showed no increase in speed at 24,000 ft., and a slightly higher rate of climb than that obtained on the 836-2C2-18 without vents. This increase in rate of climb was within the limits of experimental accuracy. Also, since no increase in speed was obtained by adding the vent holes on the blade tips, no increase in rate of climb would be expected.

Level flight high speed tests run on the Curtiss 836-2C2-18 propeller with tip vent holes, penetrate finish and experimental "C" type Curtiss cuffs showed a small trend toward improvement over the Curtiss 836-2C2-18 with standard cuffs, and tip vent holes at horsepowers above 2000. This is shown in Fig. 5.

Level flight high speed tests run on a Curtiss 836-2C2-18 propeller with a flattened blade shank, tip vent holes, penetrate finish, and experimental "D" type cuffs also showed a small trend toward improvement over the 836-2C2-18 with standard cuffs, and tip vent holes at horsepowers above 2000 as shown in Fig. 5.

A comparison of climb and level flight performance is given in Fig. 2.
D. Recommendations

None

Attached - 7 drawings

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Ngo., FEASC (11-8-49)
FIG 4:
P-47D-10 - 42-74035
LEVEL FLIGHT DATA
CURTIS PROPELLER
DESIGN NO. 286-2.2-19
STANDARD GURPS
TO. GROSS WT. 13,260 IBS.
**EXPERIMENTAL CUFF COMPARISON**

**CURTISS 536-222-18 PROPELLER**

WITH TIP VENT HOLES

- STANDARD 536 PROPELLER
- 536, PENTRATE FINISH
  AND "C" TYPE CUFFS
- 536, FLAT BLADE SHANK
  PENTRATE FINISH AND
  "D" TYPE CUFFS

**FIG 5**

P-47D-10

#42-750.38

SPEED VS POWER
TEST POINTS

2700 RPM
WATER INJECTION
AVERAGE G.W. = 13,000 lbs.
G.W. @ T.O. = 13,234 lbs.