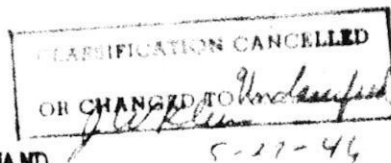


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ARMY AIR FORCES
MATERIEL ~~COMMITTEE~~ COMMAND



MEMORANDUM REPORT ON

RES/mac/47

P-47D-10RE Airplane, AAF No. 42-75035

Date 27 March 1944

SUBJECT: Comparative Propeller Tests

SECTION Flight

Classification changed to

UNCLASSIFIED

Contract No.

SERIAL No. Eng-47-1714-A

by authority of CG, AMC

Expenditure Order No. 430-4-98;

DATE *11 May 1947*

~~Expenditure Order No.~~ 430-148;

430-145

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 714-1C2-12 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, inter-cooler 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 836-2C2-18 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 836-2C2-18 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.

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C. 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. Conclusions

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 horsepower 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 horsepower above 2000 as shown in Fig. 5.

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

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D. Recommendations

None

Attached - 7 drawings

for Paul F. Bible
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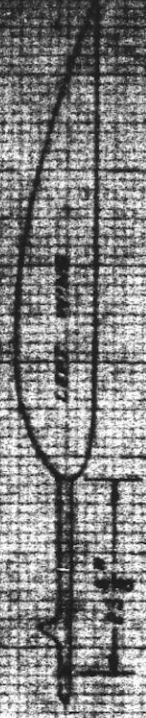
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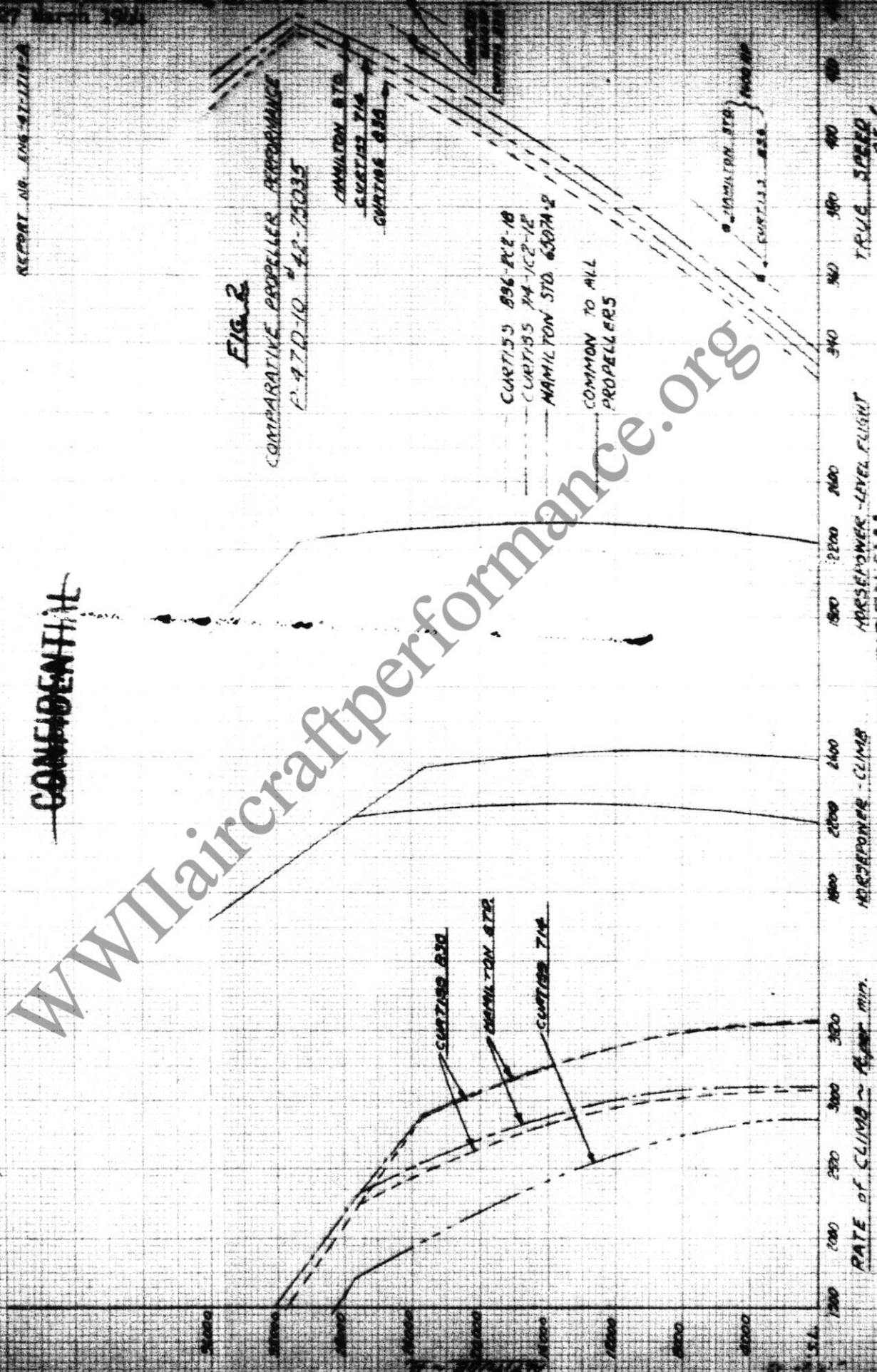
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FIG. 2

COMPARATIVE PROPELLER PERFORMANCE
 C-47D-10 "42-75035"



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HORSEPOWER - LEVEL FLIGHT

HORSEPOWER - CLIMB

RATE OF CLIMB - ft/min

TRUE SPEED

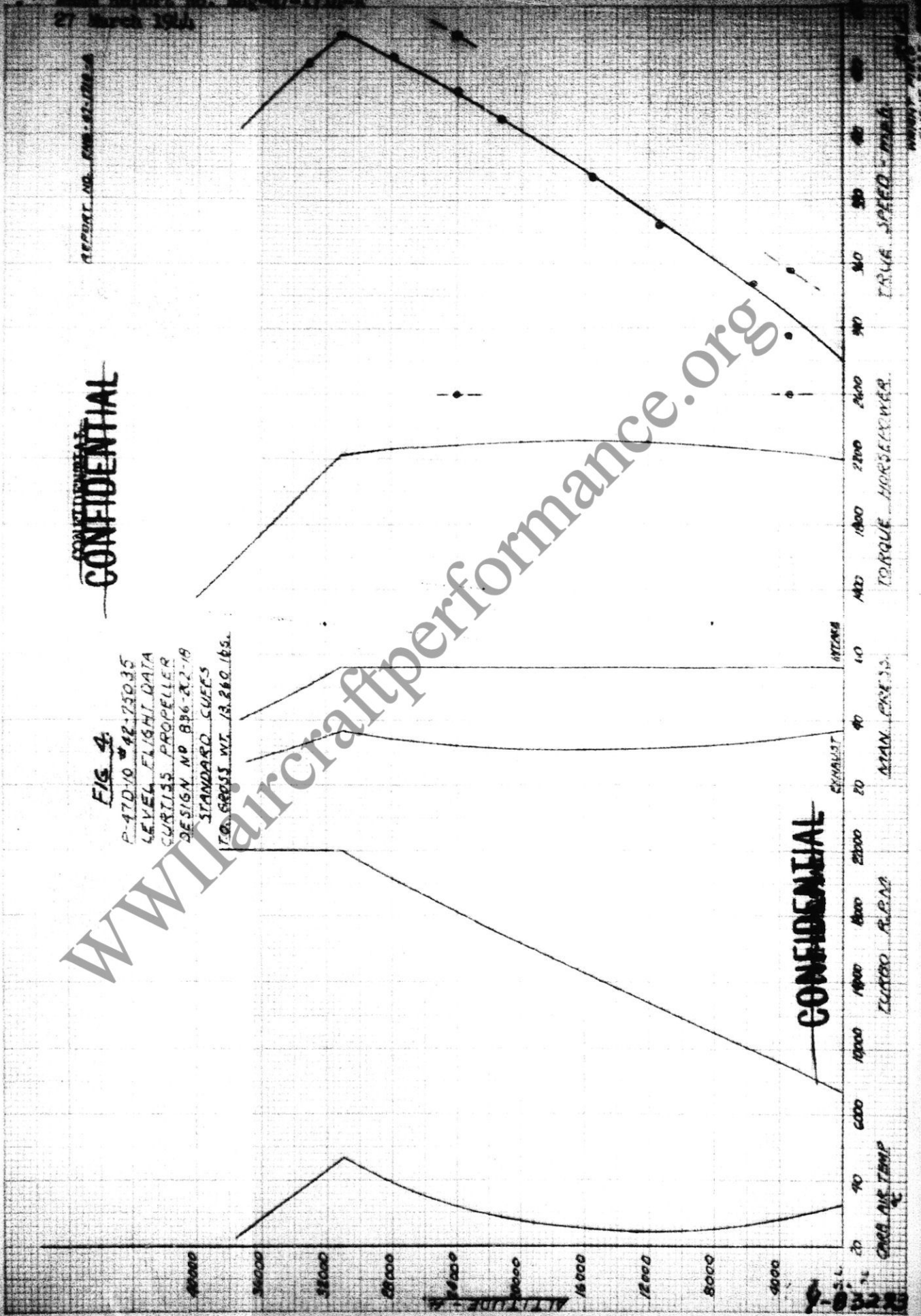
FLIGHT TEST NUMBER
 1-171-A

REPORT NO. ENG-67-170-1

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FIG. 4.

P-47D-10 #42-75035
 LEVEL FLIGHT DATA
 CURTISS PROPELLER
 DESIGN NO B86-R2-19
 STANDARD CUFFS
 TO GROSS WT 13,260 lbs.



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FLIGHT TEST

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EXPERIMENTAL CUFF COMPARISON
CURTIS B36-2C2-18 PROPELLER

WING TIP VENT HOLES

- STANDARD B36 PROPELLER
- △ B36, PENETRATE FINISH AND "S" TYPE CUFFS
- B36, FLATTENED SHAPE, PENETRATE FINISH AND "D" TYPE CUFFS

TRUE HORSEPOWER

FIG. 5

P-47D-10

#42-75035

SPEED VS. POWER
TEST POINTS

2700 R.P.M.

WATER INJECTION

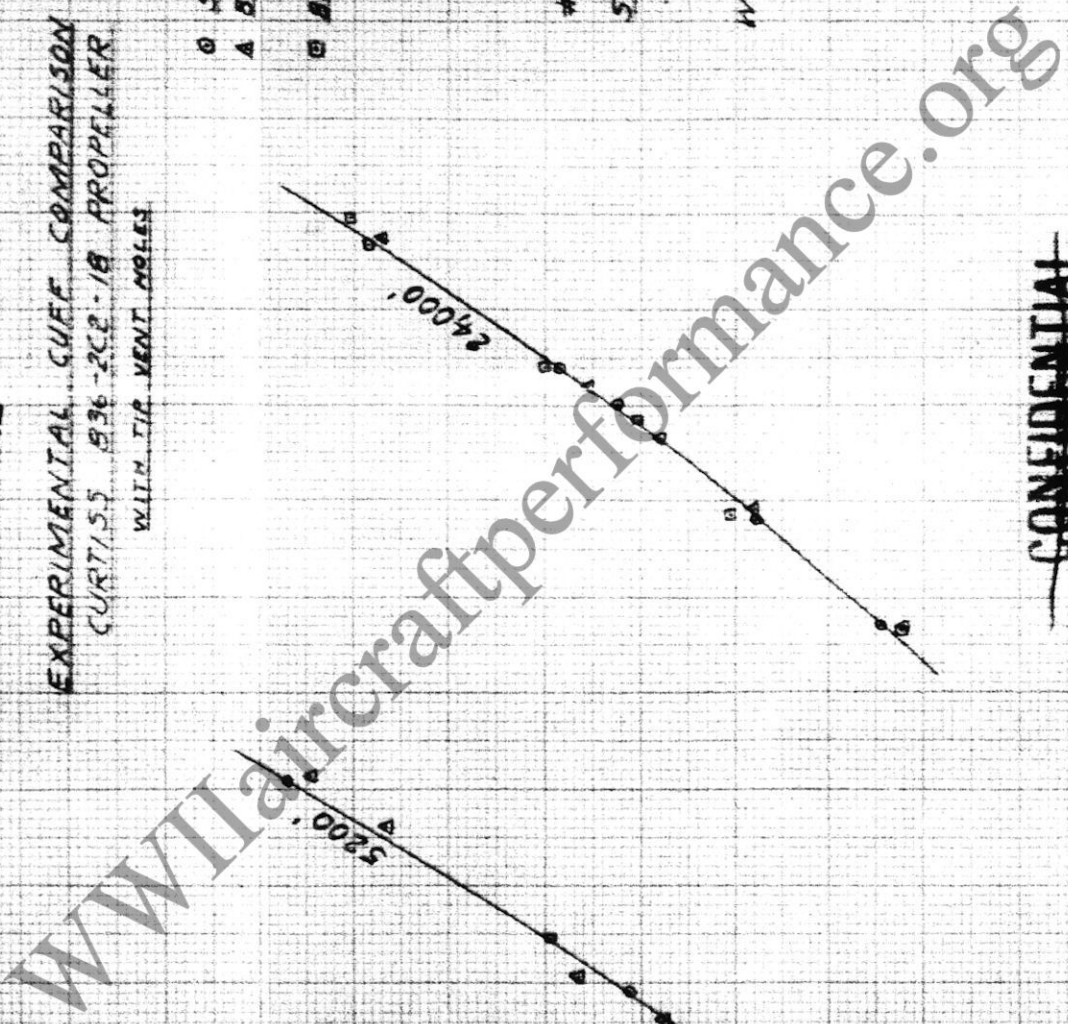
AVE. 5 M. - 15,000

GW. @ 700 - 15,200

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TRUE SPEED - m.p.h.

285
WRIGHT FIELD
FLIGHT TEST DIVISION

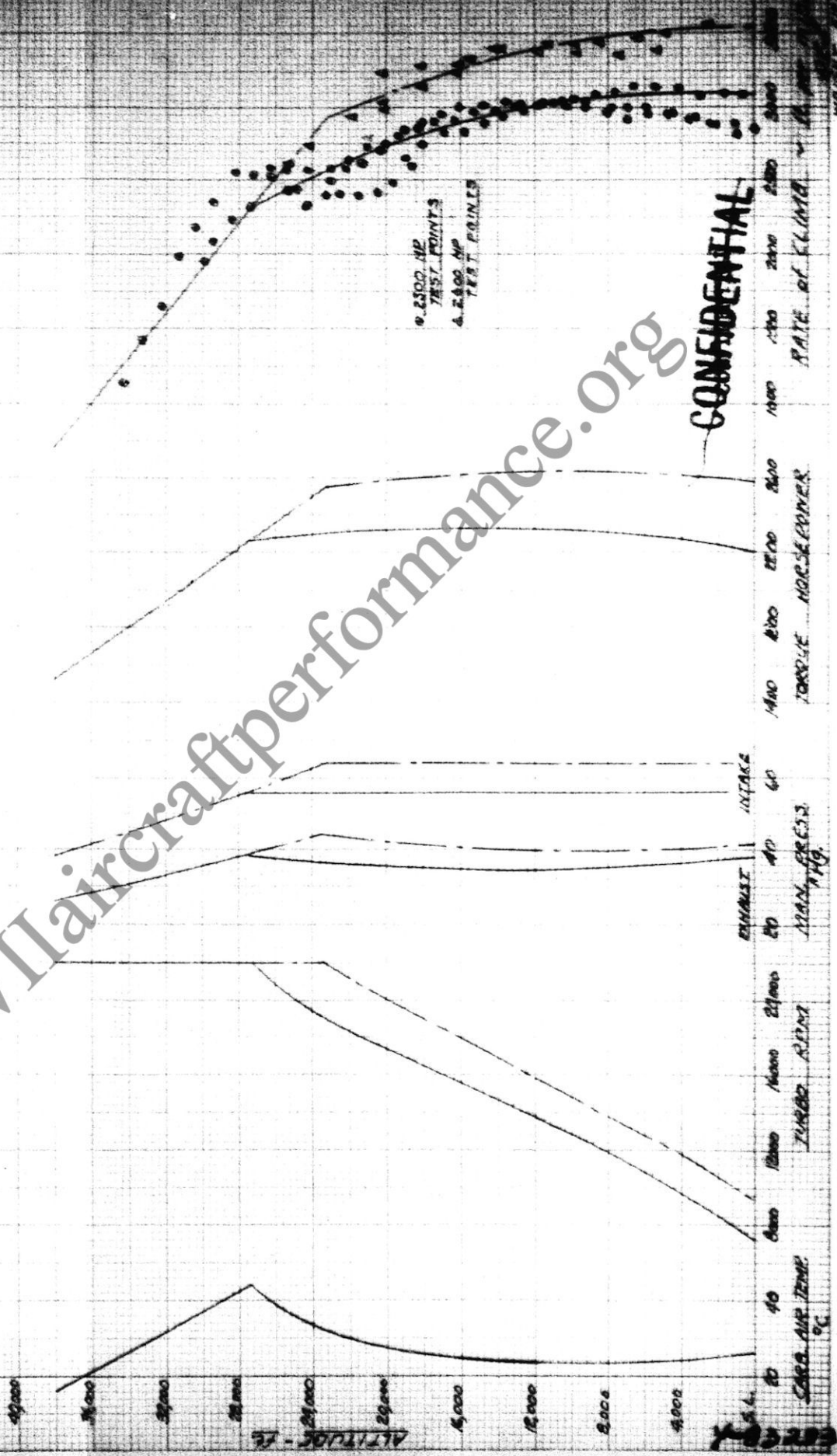


P-47D-B #4275035
CLIMB PERFORMANCE
HAMILTON STO. PROJ.
DESIGN NO. 6507A-2
I.O. SER. NO. 13345/165

REPORT NO. 800-1-10-10-10

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FIG. 6



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WEIGHT TEST NO.

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P-47D-10 #42-25035
CLIMB PERFORMANCE
CURTIS PROPELLER
DESIGN NO 836-22-1B
TO GROSS WT 13,260 lbs
FIG. 7

WEIGHT AND AIR RESISTANCE

