U. S. NAVAL AIR STATION
ANACOSTIA, D. C.

From: Commanding Officer.
To: The Chief of the Bureau of Aeronautics.

Subject: Model F4F-4 Airplane - Miscellaneous Tests - (Droppable Fuel Tanks; Performance at Military Power; Combat comparison.)

Reference: (a) BuAer. Conf. 1tr. Aer-E-2154, 75736, of 16 June 1942.

Enclosure: (A) Model F4F-4 Airplane No. 02135 - Chart of Performance Characteristics, Military Power.
(B) Model F4F-4 Airplane No. 02135 - Plot of HP Required vs. Airspeed in Various Conditions.

1. Model F4F-4 Airplane No. 02135 was made available for various miscellaneous tests between June 21, 1942 and August 19, 1942, including tests of droppable auxiliary wing tanks, comparison with the P-40F and P40-43, and a brief check of performance using the military power rating of the engine. These tests practically complete when terminated by a cracked rear crankcase requiring engine replacement. The results are reported herewith.

2. The following comments apply to the auxiliary droppable tank installation:

(a) The fuel system operated satisfactorily on the auxiliary tanks, the electric fuel booster pump being required at altitude. The delay in picking up suction when transferring from main to auxiliary tanks varied from zero at
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low altitudes up to 50 seconds at high altitude, but no failure occurred.

(b) The take-off, landing, control, and stability characteristics were satisfactory with either or both tanks installed, and at all combinations of fuel load.

(c) The tanks released satisfactorily on the ground and in flight after modification to the release mechanism. Special springs had to be fitted to cause the sway braces to drop off.

(d) One full tank and two empty tanks were released in flight. The action of the tank when released empty is rather erratic and there was considered to be some possibility of its striking the tail. Only a large number of releases will insure that this cannot occur, but as a precaution it is recommended that in this condition the release be made at moderately low speeds with power off.

(e) In order to determine the effect on drag, speed and fuel consumption, considerable data was obtained on power required at various airspeeds. The results are plotted in enclosure (3). The curve shown for power required as a normal six (6) gun fighter is considered to be more accurate than those previously available, and might be used in determining speeds for best range and endurance at other weights and altitudes. The data used in plotting similar curves with auxiliary tanks installed is less complete but is considered to be dependable.

3. The performance of the airplane (without auxiliary tanks) using the military power rating of the engine is shown in curves forming enclosure (A) and is tabulated as follows:
Model P4F-4 Airplane - Miscellaneous Tests -
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Gross weight .......................... 7933
Critical altitude for 1100 H.P. (ft) ... 17200
Maximum Speed at airplane critical alti-
(tude (mph) ............................. 312
Service ceiling (ft) ..................... 33100
Rate of climb at sea level (ft/min) ..... 1020
Rate of climb at 16300 feet altitude
(ft/min) .............................. 1500
Take-off distance in a calm (ft) ....... 675
Take-off distance in a 25 knot wind (ft). 342

Increase in indicated speed shifting from
normal rating to military rating at
19000 feet altitude (knots) ............... 2.5

4. The improvement in performance of the airplane
at and above critical altitude with the use of the military
rating appears to be very small. The carburetor air tempera-
tures while operating in either auxiliary stage at the higher
RPM are excessive and the engine was somewhat rough at maxi-
mum power. Operation at the military rating in neutral blower
was satisfactory, and improved performance was apparent. It
is concluded that the military rating is effective in neutral
blower but is not justified in the high auxiliary blower set-
ting. It is considered moderately effective in low auxiliary
setting and satisfactory for short periods under cool conditions.

5. The P4F-4 was compared to the P4F-4B, carrying
the same load, at various altitudes to determine relative
climb, speeds, and turning ability. The gross weights were
7933 lbs. and 7694 lbs. respectively. The difference in per-
formance was very small, the P4F-4B being slightly superior
in speed and climb at low altitudes and the P4F-4 slightly
superior at 15000 feet and above. There was no sensible
difference in turning ability.

6. The P4F-4 was compared to the P-40F to deter-
mine relative climb, speed and turning ability. At the con-
tinuous engine ratings the P4F-4 is superior in climb, the
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Superiority increasing with altitude, and is inferior in level
speed below 20000 feet. At the maximum ratings the F-40 is
superior in climb below 19000 feet and in level speed below
about 22000 feet. At higher altitudes the F4F-4 is superior
in all respects. It is superior in turning ability at all
altitudes, and in vision and general handling qualities.

W.V. SAUNDERS

Copies to: Bu. Aero. (4)
MO. 7 L F4F-4 AIRPLANE No. 135
PERFORMANCE CHARACTERISTICS - MILITARY POWER
GROSS WEIGHT = 7933 LBS.

CLIMB

AIRPLANE CRITICAL ALTITUDE

STD. ALT. - FT. ÷ 1000

0 500 1000 1500 2000
RATED POWER

RATE OF CLIMB - FT./MIN.

0 5 10 15 20 25 30 35

TIME - MIN.

6 GUN FIGHTER

950 1000 1050 1100

BRAKE HORSEPOWER

MAXIMUM SPEED AT AIRPLANE CRITICAL ALTITUDE: 17,200 FT.

AIRSPEED INDICATOR CALIBRATION

RATED POWER

INDICATED AIRSPEED - KNOTS

210 190 170 150 130

KNOTS MPH

700 900 1100 1300

BRAKE HORSEPOWER

270 280 290 300 310 320

TRUE AIRSPEED - MPH

110 130 150 170 190 210 230

TRUE INDICATED AIRSPEED

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WWW.Aircraftperformance.org
MODEL F4F-4 AIRPLANE No. 02135
BHP vs. TRUE AIRSPEED AT 10,000 FT -
WITH AND WITHOUT AUXILIARY DRIPPABLE
50 GAL. WING TANKS

AN-60653

WITH 2 AUX. DROP TANKS - FULL
G.W. = 8'608 lb

WITH 1 AUX. DROP TANK - G.W. = 8'120 lb
AUX. TANK 1/2 FULL

WITH 2 AUX. DROP TANKS - EACH 1/2 FULL
G.W. = 8'308 lb

W.W. = 7'933 lb

TRUE AIRSPEED - MPH

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9-13-42 FEB