ARMY AIR FORCES
MATERIEL [redacted] COMMAND

MEMORANDUM REPORT ON
Vought-Sikorsky F4U-1, No. 02296

WHB/mac/19

Date 23 August 1943

SUBJECT: Flying Characteristics and Design and Maintenance Qualities of F4U-1

SECTION Flight

SERIAL No. Eng-19-1641-A

Contract No.
Expenditure Order No. 146-16
Purchase Order No.

A. Purpose

1. To obtain pilot's comments, combat and maneuverability characteristics and design and maintenance qualities of the F4U-1 airplane, No. 02296.

B. Factual Data and Test Results

1. The airplane was flown at a gross weight of approximately 12,000 pounds including 230 gallons of fuel, full oil capacity, six .50 caliber guns with 705 pounds of ammunition, c.g. at approximately 30.8% M.A.C.

2. Pilot's Comments

a. Cockpit Layout: The general arrangement of the instrument panel is poor. The electrical panel is unnecessarily cluttered up making it necessary for the pilot to take a definite look at the panel to insure selection of the proper switch. A slanted panel would be of some aid in this respect. The stick is too short for comfort but it cannot be lengthened because of the plotting board. The landing gear retracting control is located in a bad position and is difficult to operate. The cowl flap controls are not easily identified. Brake operation is interferred with by a rod behind brakes and the rudder positioners are difficult to operate. The trim tab arrangement is satisfactory. Handles and steps are provided but access is still very difficult. In general it may be said that the cockpit arrangement is too complicated.

b. Taxiing and Ground Handling: The visibility is very poor forward over the nose and the airplane is difficult to taxi because of the swivel tail wheel which also provides poor control on sod or rough ground. Handling in a cross wind is tricky. The controls are very loose and have little feel in ground operations.

c. Take-off and Climb: The visibility forward is very poor and the airplane is difficult to control on the initial part of the take-off roll. The take-off run is very short and the climb is medium. The propeller governor is not strong enough and the gear is hard to retract. Open cowl flaps cause buffetting in climb.

d. High Speed and Level Flight: The forward visibility is very poor. The airplane requires excessive trim and the stick vibrates continuously. High speed in level flight at wide open throttle at 24,750 feet was 388.6 MPH at 2700 RPM and 51.5 "Hg giving 1525 BHP (Auxiliary stage - high ratio).

e. Handling over Speed Range: At low speed the aileron forces are too light. At medium speeds all control forces are satisfactory. At high speeds over 275 knots the ailerons become too heavy and rolling characteristics are very poor. Considerable longitudinal trim is necessary. The airplane is maneuverable and handles fairly well in aerobatics.

f. Stability and Trim: Stability and trim are satisfactory at cruising speed; however, there is a slight directional hunt and the longitudinal damping is slow.

g. Instrument and Night Flying: The airplane is very good for instrument flight as far as flying qualities go but the instrument arrangement is poor. Visibility forward both on ground and in air is poor for night flight and there is a good amount of glare off the propeller from the landing lights.

h. Stall Characteristics: The warning is good in a clean condition and the airplane will not fall off, stalling at 82 knots indicated power off. Wheels down the airplane stalls at 86 knots indicated. Opening of cowl flaps gives a stall at 82 knots indicated. With flaps down the stall warning is not quite so good and the airplane falls off on a wing to the left. Stalling speed with gear and flaps down is 76 knots indicated airspeed, power off. Opening of the cowl flaps causes buffetting at all speeds (checked up to 175 knots indicated).

i. Approach and Landing: The visibility forward in the approach and landing is very poor. The airplane seems to land best with partial flaps the minimum indicated air speed for glide being 85 knots and the recommended speed 95 knots. Minimum indicated landing speed is 75 knots.

j. Conclusions: The very poor visibility and cockpit arrangement are the principal objections plus the heavy control loads at high speeds. The maneuverability is satisfactory.

3. Combat Characteristics

A. F4U-1 vs P-51

1. The P-51 has the higher indicated rate of climb at 5000 feet and at 15,000 feet.

2. The P-51 has a slower initial acceleration than the F4U-1 but quickly catches up and passes F4U-1 starting from level flight in formation.

3. The P-51 has the greater high speed in level flight at 9500 feet.

4. The F4U-1 has the better deceleration cutting off power from a level flight formation start.

5. The F4U-1 had the best level flight radius of turn both when lead and trailing airplane, with or without flaps.

6. The F4U-1 has the better rate of roll at all level flight speeds but at about 280 MPH indicated the P-51 becomes better and remains better as diving speeds increase.

7. The P-51 has a better initial zoom but the total altitude gained is slightly better in F4U-1. Zoom was started at 10,000 feet and zoom characteristics, it is believed, would be a function of the starting altitude because of the difference in engine types on the two airplanes.

8. The P-51 loses altitude faster in a push over from level flight at high speed.

9. The F4U-1 is better for close-in fighting.

B. F4U-1 vs P-47C

1. The F4U-1 has the better rate of climb at 5000 feet altitude; however, at 10,000 feet the two airplanes have the same rate of climb with the P-47C improving and having the best rate of climb at 25,000 feet.

2. The F4U-1 has the better initial acceleration but the P-47C quickly catches up and passes the F4U-1.

3. The P-47C has the greater high speed in level flight at 22,000 feet.

4. The F4U-1 has the better deceleration cutting off power from a level flight formation start.

5. The F4U-1 has the best level flight radius of turn both when lead and when trail airplane, using best flap setting.

6. The airplanes have the same rate of roll in level flight speed but at 300 MPH the P-47C is better and remains better as diving speeds increase.

7. The F4U-1 has the better initial zoom but the P-47C catches up with it resulting in the same total gain in altitude.

8. The F4U-1 noses over more sharply in a push over from level flight at high speed but the P-47C quickly out dives the F4U-1.

9. The F4U-1 is better for close in fighting.

C. F4U-1 vs P-38G (Light Weight)

1. The P-38G has the best rate of climb at all altitudes.

2. The P-38G has the better acceleration from a level flight formation start.

3. The P-38G has the greater high speed in level flight.

4. The F4U-1 has the better deceleration from a level flight formation start.

5. The F4U-1 and the P-38G (stripped) have the same radius of turn with and without flaps. The F4U-1 has a slight edge over the standard P-38G.

6. The F4U-1 may have a slight edge in rate of roll at slow speed but at high speeds the P-38G has the better rate of roll because of the high stick force and ineffective ailerons on the F4U-1.

7. The F4U-1 has the better initial zoom due to lighter wing loading, although the P-38 has the best total zoom.

8. The F4U-1 noses over more sharply than the P-38G in a push over from level flight at high speed but the P-38G quickly accelerates past the F4U-1.

9. The F4U-1 may have a slight advantage in close in combat but the P-38G has the greater ability to engage in and break-off combat.

4. General Maintenance Qualities

The time required to do maintenance work on this airplane is greater than on other Army Air Force fighter planes. The construction of the airplane makes servicing and work on the accessories difficult. Removing the cowling requires too much time and the intercooler Y duct must be removed before working on the accessories. In addition the following difficulties are encountered:

a. The operation of cowl flaps causes breakage in the hydraulic lines which in turn covers the windshield with oil making visibility very poor. This trouble is also due to oil leaking from the packing around the cowl flap cylinders.

b. Exhaust stacks crack and break and due to their long length they shake or vibrate loose at the connection to the engine.

c. Brakes are difficult to keep in shape because they have no outside protection from dirt, sand, and water.

d. The rubber connections on the intercooler must be replaced often due to large and small fires or backfires in the intercooler scoop.

e. Hydraulic fluid leaks back into the CO_2 line because of a faulty valve causing the landing gear to remain down in the extended position. To prevent this trouble the CO_2 line must be drained often.

f. The space between the bullet proof windshield and the outer windshield glass is very small making it difficult to keep the glass clean.

g. The airplane can be jacked up only by using a good many sand bags on the tail surface and a hoist on the nose.

h. Catridge type starter makes starting in cold weather difficult. In addition with a high pressure type carburetor it gives the pilot no chance to keep the engine running after a backfire thus increasing the fire hazard.

i. The location of the landing light switch is unsatisfactory in that it may be flipped unintentionally causing the lights to extend and wear down the battery.

j. Leaks in the hydraulic lines and connections for the wing folding system are experienced and the adjustment of the locking pins also is a source of trouble.

k. The tail wheel does not caster correctly when taxiing the airplane

In general the airplane is unsatisfactory for servicing and maintenance work.

MAS. Wilbur H. Bockmann Capt AC

Prepared by WILBUR H. BOCKMANN, Capt., AC

S. A. Gilkey

Approved by S. A. GILKEY, Colonel, A.C.
Chief, Flight Section

W. E. Lamar

W. E. LAMAR
Captain, A. C.

Approved by W. Z. BOOKRI, Colonel, A.C.
Acting Chief, Engineering Division

Distribution:
Chief, Engineering Div.
Attn: Flight Research Liaison Br.
Project Officer, Capt. W. E. Lamar, Eng. Div.
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