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WAR DEPARTMENT

AIR CORPS, MATERIEL DIVISION

Unclass 4-4-46

EK-da

MEMORANDUM REPORT ON
Curtiss P-40E, A. C. No. 40-633

Date May 14, 1942

SUBJECT: Spin Tests

Classification changed to UNCLASSIFIED by authority of CG, AMC

SECTION Flight Section

Contract No. 430-4-61

Expenditure Order No.

SERIAL No. PEQ-M-19-1398-A

Purchase Order No.

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A. Purpose

1. To report results of Spin Tests conducted on the P-40E airplane, A. C. No. 40-633 for several load conditions and gun port or blast tube configurations.

B. Test Results

1. Right and left hand power off, two turn spins were made by Lt. Col. E. K Warburton, Capt. Ritland, Capt. Estes, and Capt. Peterson from straight stalls and stalls in turns for the following load conditions and gun port or blast tube configurations.

a. Gross weight of 7546 pounds at 24.9 percent m.a.c., wheels up; with full wing tanks, empty fuselage tank and no ammunition; gun ports covered.

b. Gross weight of 8026 pounds with c.g. 26.3 percent m.a.c. with full wing tanks, empty fuselage tank, and full ammunition load; gun ports covered.

c. Gross weight 7921 pounds with c.g. 29.3 percent m.a.c. with full wing tanks, full fuselage tank, and no ammunition; gun ports covered.

d. Gross weight 8161 pounds with c.g. 29.8 percent m.a.c. with full wing and fuselage tanks and 50 percent full ammunition load; gun ports covered.

e. Gross weight 8400 pounds with c.g. 30.2 percent m.a.c., wheels up, with full wing and fuselage tanks and full ammunition; gun ports covered.

f. Same loading as condition e. but with gun port covers removed.

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Archives of M. Williams

g. Same loading as condition e. but with ball and tube type blast tube arrangement as installed on P-40F airplanes.

h. Same loading as condition e. but with blast tube arrangement simulating that on the Curtiss "Tomahawk" airplanes, per drawings furnished by the Aircraft Laboratory.

2. The spinning characteristics of this airplane were so erratic under all loading conditions that it was difficult to make a direct comparison except that as the c.g. moved back the spin became flatter and slower. Steady and unsteady, oscillating and whipping spins could all result from the same type of entry.

3. Condition e. was the worst loading condition and the different blast tube arrangements, f., g., and h. made no noticable difference in the spinning characteristics.

4. Both right and left two turn spins were made from stalls and turns. Spins were slower for condition e. than for other conditions, although a majority of spins were still unsteady with violent oscillations and whipping. An occasionally steady spin was obtained. The nose comes up higher and the attitude of the airplane changes from 60° to 20° for right spins and from 60° to above the horizon for left spins. Spins were made with the rudder full with the spin and stick full back with the ailerons neutral. Rudder tends to return to neutral; stick tends to go with the spin or against the spin once displaced from neutral.

5. Recovery was effected with full opposite rudder and approximately one-half forward stick in from 1/2 to 1-1/2 turns although some steady spins required 2-1/2 turns for recovery. Rudder forces were heavy at full travel, stick forces were moderately heavy full back and heavy toward full forward position. Aileron forces were normal.

6. Approximate loss in altitude was 1000 feet per turn in a left spin and slightly more in a right spin. Spins were started between 13,000 and 15,000 feet and about 4000 feet was required for the complete manouver. (5300 feet was required for four-turn smooth spins and recovery!) Upon recovery, the nose is down almost vertical and the airspeed reaches a maximum of approximately 200 M.P.H. It was very easy to stall the airplane inadvertently up to 150 M.P.H. I.A.S. in the pull out.

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7. Spinning characteristics of this airplane are not good but no difficulty was experienced in recovery from any of the eighty spins, by four different pilots, made during these tests.

8. Pilot's Spin Reports are enclosed herewith.

C. **Recommendations**

1. Pilots who inadvertently get into spins below 5000 feet be instructed to jump rather than to try to effect recovery.

2. Practice spins should be started at least 15,000 feet above the ground.

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