

ARMY AIR FORCES *Tr*
MATERIEL ~~COM~~ COMMAND

MEMORANDUM REPORT ON
P-390 Airplane, AAF No. 44-3455

FAB:hbs:47

Date 28 July 1964

SUBJECT Report of Spin Tests

SECTION Flight

SERIAL NO. Eng-47-1779-A

Expenditure Order No. 430-155

A. Purpose

1. The purpose of this report is to submit results of spin tests on the P-39 airplane, AAF No. 44-3455.

B. Factual Data

1. Introduction:

These tests were conducted at the request of the Aircraft Laboratory, Engineering Division. Two flights were made totaling approximately 2 hours, 10 minutes flying time. On the second flight the pilot bailed out after failing to recover from a left spin, power on entry. A copy of the accident report is attached.

2. Airplane Configuration:

The gross weight of the airplane at take-off was 8205 pounds with the c.g. location at 26.6% MAC. This included full fuel and oil, 185 pounds of ballast for ammunition in the wing and 75 pounds of ballast for ammunition in the nose. The airplane was equipped with wing guns and a three-bladed Aero-Products propeller, Diameter 11 feet, 7 inches. Anti-spin chutes were installed on the upper surface of each wing tip.

3. Spin Characteristics:

a. Right Spins (Power-off, straight ahead entry).

Twelve spins to the right of from two to five turns were made. Each spin was entered from a power-off glide, full right rudder and right aileron being applied as the airplane approached the stall. The airplane seemed to do a half snap roll before entering the spin.

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There was a pronounced longitudinal oscillation during the spin, the nose of the airplane traveling from about 45 degrees above the horizon to about 80 degrees below. The rate of rotation was irregular being quite slow as the nose passed above the horizon and accelerating rapidly as the nose dropped. There was a tendency for the spin to tighten and the longitudinal oscillations to become more violent as the spin progressed. All control forces were heavy during the spin. The rudder remained about neutral but buffeted violently during the spin. Spins with the stick full back and with full right, full left, and neutral ailerons had no noticeable effect on the spin characteristics. The only effective control surface was the elevator.

Approximately 5000 feet was required to do five turns and about 1500 feet for recovery. Recovery could be made in $3/4$ to 1 turn. The best recovery technique seemed to be the simultaneous application of full left rudder and neutralizing the stick. During the recovery there is a tendency to stall and re-enter the spin. The application of power did not aid the recovery.

b. Right Spins (Power-on, right turn entry).

Two spins were made to the right from a power on stall in a right turn at approximately 150 MPH and $2\ 1/2$ to 3 g acceleration. Power was retarded immediately after entering the spin. The resultant spin was similar to the other right spins and recovery was easily made.

c. Left Spins (Power-off, straight ahead entry).

Seven spins to the left of from two to five turns were made. These spins were similar to those made to the right with the exception that recovery was not quite as positive as in the right spin.

Approximately 5000 feet were lost in a five turn spin and 1500 to 2000 feet required for recovery. Control forces were heavy during the spins and as in the right spin the best recovery technique was the simultaneous application of right rudder and neutralizing the stick.

d. Left Spins (Power-on left turn entry).

One left spin was made from a stall in a left turn at approximately 150 MPH and $2\ 1/2$ to 3 g acceleration. The airplane entered the spin quickly and it was immediately apparent that this spin was of an entirely different nature. The airplane spun smoothly with no longitudinal oscillations and only moderate rudder buffeting. The spin was extremely flat, it is estimated that the nose was about 20 degrees below the horizon. The rate of rotation was faster than all previous spins. Recovery was attempted at $1\ 1/2$ to 2 turns with no success. All the controls were heavy but had no effect on the airplane. By violently pumping the elevator the nose could be made to drop slightly but would soon return to the original position. Ailerons and rudder were entirely ineffective as was the throttle. The spin was started at 18,500 feet, at about 11,000 feet the right spin chute was opened but had no effect in stopping the spin. At approximately 4000 feet the right door was jettisoned

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and the pilot bailed out. The airplane continued to spin and crashed about 15 miles south of Wright Field.

C. Conclusions

1. The P-39 should not be spun intentionally under any circumstances.
2. The P-39 should not be snap rolled as the roll usually ends in a spin.
3. The best spin recovery is to simultaneously apply opposite rudder and neutralize the stick.
4. Power should be cut immediately if a power on spin is entered.
5. Care must be exercised during the recovery to prevent an accelerated stall and re-entry into the spin.
6. The wing tip spin chute does not aid recovery of the P-39 from a flat spin.

D. Recommendations

1. It is recommended that current P-39 spin recovery instructions be modified as above.
2. It is recommended that pilots be instructed to bail out of a P-39 if they have not recovered from a spin within safe altitude after application of recovery techniques.
3. It is recommended that tests be conducted to determine the value of spin recovery chutes and any other devices designed to aid in spin recovery.

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IOM, 22 July 1944

To: Chief, Flight Section

Subj: Accident Report

Prepared by FREDERIC A. BORSONI, Major, A.C.
Acting Chief, Fighter Flight Test Br.

Approved by ERNEST K. WARBURTON, Colonel, A.C.
Chief, Flight Section, ~~Eng. Br.~~

Approved by F. O. CARROLL, Major, A.C.
Chief, Engineering Division

W. E. LAMON
Captain, A. C.
Chief, Aircraft & Test
Engine Branch

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