CONFIDENTIAL

ARMY AIR FORCES
MATERIEL COMMAND

MEMORANDUM REPORT ON P-51B Airplane, AAF No. 42-12136

HAK/mac/47

SUBJECT: Spin Tests

Date 30 April 1946

SECTION Flight

Contract No.

SERIAL No. Eng-47-1737-A

Expenditure Order No. 430-126

Purchase Order No.

Capt USAF

A. Purpose

To report the results of spin investigations conducted on the P-51B airplane, AAF No. 42-12136.

B. Factual Data

1. Introduction

The airplane was spun by Major O. E. Lundquist, Major P. J. Ritchie and Captain W. A. Lien of the Flight Section. Completed spin forms were submitted by these pilots. A total of thirty spins were made in each direction with methods of entry from straight ahead stalls, turns and snap rolls, power on and power off.

2. Airplane Configuration

The gross weight of the airplane at take-off was 9130 lbs. with the c.g. location at 27.0% m.a.c., gear up. Spin chutes were installed on the tail. Spins were made with wheels and flaps up and with coolant and oil shutters in automatic.

3. Spin Characteristics

A consolidation of the pilots' comments on the spin characteristics is as follows:

a. Left spin (power off)

From a straight ahead stall entry the airplane rolls sharply with the nose oscillating from 60° below the horizon back to the horizon during the first turn. The oscillations dampen out considerably during the second turn after which the spin continues with the nose oscillating 30 to 40° below the horizon. During the first two turns the spin is very rough and as the oscillations dampen out the spin becomes more smooth. A slight rudder buffet occurs throughout the spin, seeming to buffet in phase with the oscillations of the spin.

When entering the spin from a left turn a partial snap roll

occurs, followed by falling with the nose down and very slow rate of rotation. The nose gradually comes up into oscillation and the spin becomes identical in characteristics as above.

Recovery was made by applying full opposite rudder and moving the control stick slightly forward of neutral. Control movements were rapid. Upon application of opposite rudder the nose drops slightly and the spin speeds up from 3/4 to 1 turn after which the spin stops. It was noticed that recovery was quicker if opposite rudder was applied during the nose down part of the oscillation.

Approximately 3700 feet were lost in a two turn spin and 6500 feet in a five turn spin for the entire maneuver.

b. Right spin (power off)

The right spin starts exactly the same as the left but the oscillations continue without changing in magnitude with the nose approximately 40 to 50° below the horizon. The right spin is faster than the left spin but it is not as rough especially during the first two turns.

Recovery procedure is the same in a right spin as in a left spin. Recovery is effected more quickly, however, with the spin stopping in 1/4 to 1/2 turn after opposite rudder was applied. Approximately 3000 feet was lost in a two turn spin and 6300 feet in a five turn spin.

c. Left spin (power on)

With the power on at 20" Mg., 2300 RPM, straight stall entry, the airplane oscillates in spin from 15 degrees above to 60 degrees below the horizon. When power is cut the spin becomes similar to the power off spin. With increased power the oscillations become so violent that power must be cut off and recovery effected as the oscillations do not tend to decrease when the power is cut.

Recovery was made with the power off and was similar in procedure to that used in a normal power off spin. Power on spin recovery was not attempted. Approximately 5000 feet were lost in a two turn spin.

d. Right spin (power on)

With the power on at 20" Mg., 2300 RPM, straight stall entry, the first turn of the spin is flat and slow. The oscillation then becomes similar to the power off spin. With power cut off recovery was normal.

e. Recovery Characteristics

There appears to be a danger of over controlling on recovery. Generally there are two phases in the spin when recovery can be started, one being at the peak of the oscillation and the other when the oscillations have decreased to a minimum. If recovery is made at the minimum oscillating point, neutralizing stick and rudder is sufficient to stop the spin immediately.

If full opposite controls are used, a spin in the opposite direction is apt to result.

If full recovery controls are applied at the peak of oscillation no effect is obtained until the oscillation stops. At this point recovery will occur and if controls are not neutralized immediately, a spin in the opposite direction will result.

In the dive recovery, the elevator force is very light and caution must be observed not to attempt too fast a recovery as over acceleration will result.

4. Effect of Spin Chutes on Recovery

Left and right spins were executed by Major G. E. Lundquist using the tail spin chutes to assist in recovery. When the chutes are opened after a two turn spin the nose of the airplane drops. The speed of the spin increases and oscillations decrease in magnitude. A normal recovery can be executed in 1/4 to 1/2 turn.

C. Conclusions

1. The spin characteristics of the P-51B are satisfactory for this type airplane, although there seems to be less consistency in regards to attitude in spin, oscillations and difference between left and right spin, than was found in the P-51 or the P-51A.

2. The danger of over controlling in recovery exists, for at the point of minimum oscillation opposite controls will begin a spin in the opposite direction.

3. Power should be cut immediately if a power on spin is entered as the power on spin is very violent. Power off recovery can be easily executed.

4. Tail spin chutes are effective in assisting in recovery from spins on the P-51B as control can be effected within 1/4 to 1/2 turn after the chutes are opened and recovery controls applied.

D. Recommendations

1. It is recommended that no intentional power-on spins should be attempted with this airplane. If a power-on spin is entered from any position, the power should be cut immediately and recovery controls applied.

2. It is recommended that the airplane be restricted from snap rolls as it does a very poor snap roll and usually ends up in a spin.

Flight Test Engineering Branch
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