P-63 DATA

AAFMC-265-A-WF-3-7-44-100M

INTER-OFFICE MEMORANDUM

ARMY AIR FORCES
MATERIEL COMMAND
Office of The Commanding General

Major P. J. Ritchie
mem:47 Tel. 2-6258
Wright Field, Dayton, Ohio

Date 14 April 1944

TO: Chief, Engineering Division
Materiel Command
Wright Field

SUBJECT: Stability Tests on P-63A Airplane, AAF No. 42-68964 with Bob Weight Installed

1. On 4 April 1944, the P-63 airplane, AAF No. 42-68964, was flown by Major Perry J. Ritchie at the Bell factory, Niagara Falls, New York.

2. The airplane configuration is as follows: Gross weight 8800 pounds, center of gravity 24-1/2 per cent m.a.c., and 28 per cent m.a.c. at take-off, 84 inch pound bob weight (24 pounds on 3.5 inch arm) standard elevator (short cord, fabric covered, wide spaced ribs), plus one degree horizontal stabilizer setting and re-enforced outer wing panel leading edges.

3. The airplane was flown at 24-1/2 per cent c.g. for fifty minutes. Another flight was made for one hour with the c.g. at 28 per cent. This airplane had an 84 inch pound bob weight installed. The longitudinal stability was checked at the speeds of 325 MPH, 265 MPH with power on and 150 MPH with power off. The stick force per g was obtained at both c.g. positions at 300 and 400 MPH at 10,000 feet.

4. As shown in Exhibits "A", "B" and "C", the longitudinal, dynamic and static stability of the airplane is satisfactory, however, the stick force per g as shown in Exhibit "D" is dangerously low at 28 per cent m.a.c. This is evidenced by the resulting high accelerations which have been obtained by pilots, other than the Flight Section pilot, who attempted to get 7 and 8 g's. Some of these pilots reached accelerations of 10 g and wrinkled the re-enforced wings. It is believed that the stick force per g should be higher. The plus one degree stabilizer setting is an improvement on the airplane stability. The combination of the bob weight and plus one degree stabilizer setting is not considered the final solution to the stability problem on this airplane. It is believed that the deflection of the fabric on the elevator contributes detrimentally to the stick force gradient. A closely spaced rib elevator or a metal covered elevator should be tested as a probable solution to this problem.

Signature .....

5. A conference was held at Wright Field, Dayton, Ohio, on 7 April 1944, attended by representatives of the Materiel Command, including Major Perry J. Ritchie of the Flight Section, N.A.C.A. and Bell Aircraft Corporation for the purpose of discussing the progress made to date on the P-63 stability program. After the discussion was completed, the program was divided into three categories:

a. P-63 airplanes will currently be delivered with standard elevators and the plus one degree horizontal stabilizer setting. All current restrictions will remain in force.

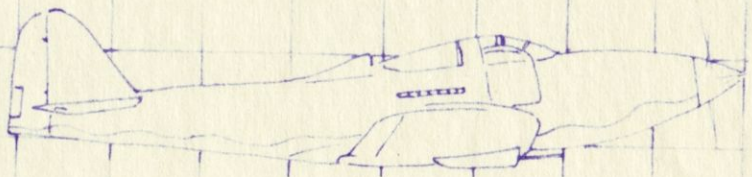
b. If the current test program appears to become extensive (that is four to five months), and a bob weight elevator combination is found which greatly improves the stick force gradient, it is likely that a limited quantity of P-63 airplanes could be released for combat until the final tail changes are determined.

c. A final solution of the stability program is one which will render the airplane satisfactory without the use of a bob weight.

ERNEST K. WARBURTON
Colonel, Air Corps
Chief, Flight Section
Engineering Division

Exhibit "A"

STABILITY ON P-63A WITH BOB WEIGHT



C.G. = 24.5 %
C.G. = 28 %

INDICATED AIRSPEED - M.P.H.

370
360
350
340
330
320
310
300
290
280

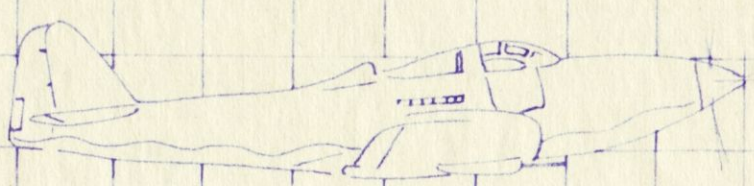
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

TIME IN SECONDS

TRIM SPEED = 325 M.P.H.
ALT. = 10,000
WT. = 8,800
POWER = 40" 2600 R.P.M.

Exhibit "B"

STABILITY ON P-63A WITH BOB WEIGHT



C.G. = 24.5 %
C.G. = 28 %

INDICATED AIRSPEED - M.P.H.

310
300
290
280
270
260
250
240
230
220

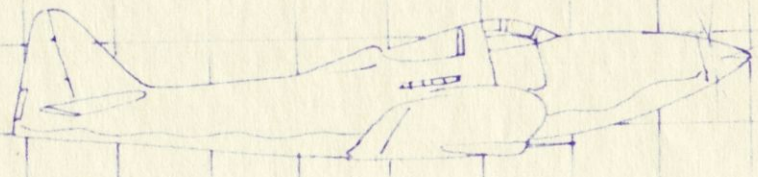
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

TIME IN SECONDS

TRIM SPEED = 265 M.P.H.
ALT. = 10,000
WT. = 8,800
POWER = 30" 2200 R.P.M.

Exhibit "C"

STABILITY ON P-63A WITH BOB WEIGHT



C.G. = 24.5 %D
C.G. = 28 %D

INDICATED AIRSPEED - M.P.H.

190
180
170
160
150
140
130
120
110
100

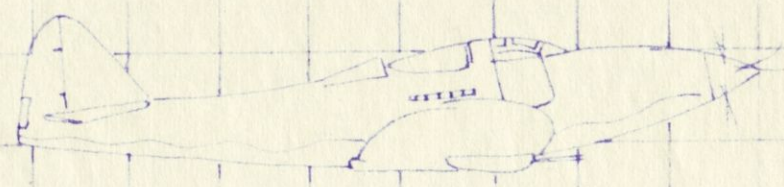
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160

TIME IN SECONDS

TRIM SPEED = 150 M.P.H.
ALT. = 10,000
WT. = 8,800
POWER = OFF

Exhibit "D"

STICK FORCE VS. "G" FOR P-63A WITH BOB WEIGHT



C.G. = 24.5 %
C.G. = 28 %
ALT = 10,000'

STICK FORCE - POUNDS (PULL)

45
40
35
30
25
20
15
10
5
0

400 M.P.H.
300 M.P.H.
400 M.P.H.
300 M.P.H.

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

ACCELERATION - "G"