ARMY AIR FORCES

AIR [redacted] COMMAND
MATERIEL

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MEMORANDUM REPORT ON ME-163B Aircraft, Serial No. [redacted]

TSFTE/GKL rah/2-3195

Date: 12 June 1946

SUBJECT: Pilot's Comments

OFFICE: TSFTE

SERIAL NO: TSFTE-1996

FROM: [redacted] Capt USAF

a. Purpose

The purpose of this report is to forward pilot's comments on the German rocket-propelled ME-163B Aircraft.

b. Factual Data

1. General:

a. The ME-163B is a liquid - rocket-propelled, single seat interceptor fighter of tailless design.

b. The approximate overall dimensions of the airplane are as follows:

(1) Wing span - 30 feet, 6 inches.
(2) Fuselage length - 19 feet, 5 inches.
(3) Height (to top of rudder) - 9 feet, 4 inches.
(4) Wing area - 210.2 sq. feet.

c. Control Surfaces

(1) The single fin has an area of about 11 sq. feet. The rudder is aerodynamically balanced and is fitted with a fixed plate tab. Rudder control is conventional and the rudder pedals are adjustable.

(2) There are no horizontal tail surfaces.

(3) Longitudinal and lateral control is obtained by use of "elevons". The elevons are aerodynamically balanced, extending to the wing tips, and are fitted with fixed plate tabs which are ground adjustable.

The controls are constructed in such a manner than when the control column moves in a true lateral movement the elevons operate in opposite directions, acting as ailerons; fore and aft movement operates them simultaneously up or down, making them act as elevators. True diagonal motion operates only one of the elevons, the other remaining stationary.

(4) Fixed slots are used along the leading edge of the wing to avoid stick reversal at the stall and to obtain directional stability about a vertical axis. The slots extend inboard from the wing tips about half the semispan.

(5) Longitudinal trim of the airplane is controlled by use of trailing edge trim flaps located inboard of the elevons. The trim flaps are operated by means of a hand wheel on the left side of the cockpit. When it is rotated a pointer moves along a scale graduated in degrees.

d. Wing flaps are located on the under side of the wing at 50% of the chord. The flaps are hydraulically driven and are manually operated by means of a hand pump in the cockpit.

e. The droppable twin-wheel undercarriage is bolted to the retractable skid. During the period just after take-off, the wheels are dropped by moving the landing gear handle to the "up" position. Compressed air releases the wheels and retracts the skid. The retractable tail wheel is coupled to the rudder through linkage and provides the only means of directional control on the ground until sufficient speed is attained when the rudder becomes effective.

f. A small propeller drives the generator in the nose of the airplane which supplies the current for instrument operation, radio, etc.

2. Weight and C. G. Information:

The gross weight of the airplane including the pilot is approximately 4,200 pounds with the C. G. position 430 mm (17 in.) aft of the main bulkhead. This figure was recommended as the best balancing point by Dr. Lippisch, designer of the ME-163.

3. Flight Characteristics:

a. Take-off and Climb

No powered flights were made. The ME-163 was towed to altitude by a B-29, AAF Serial No. 42-93921, released and flown as a glider. A 250 foot, 11/16" diameter nylon tow rope was used.

The airplane was virtually uncontrollable in the slip stream of the B-29, making take-off extremely hazardous. Once in the air and above the slipstream the aircraft handled satisfactorily. Take-off speed was approximately 120 mph indicated; wheels were dropped and skid retracted at about 150 mph indicated after clearing the runway.

b. Stability and Control

(1) Dynamic longitudinal stability - With the airplane trimmed in steady gliding flight at 175 mph indicated, the elevator control was abruptly deflected and released. The ensuing oscillation was completely damped in one-half cycle.

(2) Static Longitudinal Stability - The airplane was trimmed in steady gliding flight at 175 mph indicated and then by movement of the elevator control only the airplane was stabilized at each of several speeds above and below the trim speed. Variation of stick force and elevator position versus indicated airspeed is given in Figure I.

(3) Stick forces in manuevering flight - Stick force per "g" was determined at two altitudes using the diving turn method. Results are given in Figure II. The change in normal acceleration appears to be proportional to the elevator control force applied.

(4) Characteristics of the Longitudinal Trimming Device - The trim flaps were capable of reducing the elevator control force to zero in all conditions of steady flight.

(5) Dynamic Lateral Stability - With the airplane trimmed in steady gliding flight at 175 mph indicated, the airplane was yawed to a steady sideslip with wings level and the controls returned rapidly to their trim position and held fixed. The ensuing oscillation was completely damped in three oscillations.

The above procedure was repeated except that instead of returning the controls to their original trim positions, they were abruptly released. Again the oscillation was completely damped in three cycles.

The rudder and ailerons, when deflected and quickly released, returned rapidly to approximately their trim positions and exhibited no undamped oscillatory tendencies.

(6) Lateral Control - At all speeds reached, the rolling velocity obtained by abrupt use of ailerons varied smoothly with the aileron deflection and appeared proportional to the aileron deflection. Control forces were satisfactory and variation of control force with stick deflection and rate of roll appeared to be quite uniform.

(7) Rudder Control Characteristics - The rudder control is light and effective and is sufficiently powerful to maintain directional control during take-off and landing.

c. Stall Characteristics

A complete stall in the true sense of the word was actually not reached. In the clean configuration, with the stick full back, the airplane's speed was reduced to 95 mph indicated, where it remained constant and the airplane began to sink rapidly. No pitching or rolling

was evidenced and the airplane was allowed to settle for almost two thousand feet without changing attitude. Recovery was effected immediately by normal use of the controls.

With the skid extended and the landing flaps full down a lower speed of 91 mph indicated was reached, although the airplane behavior was the same.

c. Approach and Landing

All landings were made on the hard surface of the dry lake bed at Muroc Army Air Base, California, with skid extended and flaps full down. Best approach speed was found to be about 120 mph indicated and ground contact was made at approximately 100 mph indicated. The landings were unusually smooth, the shock being completely absorbed by the skid, and it was possible to hold the airplane in a straight line without dropping a wing to practically a complete stop.

C. Conclusions

1. The ME-163B is a highly maneuverable airplane possessing unusually good stability and control characteristics, especially for a tailless design.

D. Recommendations

1. It is recommended that the flight test on the ME-163B be discontinued. Very little additional information can be obtained by further flights without power and the airplane is not in good enough structural condition to be flown with power.

[redacted]

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