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ARMY AIR FORCES
MATERIEL CENTER COMMAND

MEMORANDUM REPORT ON ELS/mac/47
Lancaster III, British Bombardment Airplane
Date 6 December 1943

SUBJECT: Pilot's Comments

SECTION Flight

SERIAL No. Eng-47-1658-F

Contract No.
Expenditure Order No.
Purchase Order No.

A. Purpose.

To submit pilots' comments on the A. V. Roe Lancaster, four engined British heavy bombardment airplane.

B. Factual Data.

1. Introduction.

A Lancaster III equipped with four Merlin 28 engines and a Lancaster II powered by four Hercules XVI engines were flown by two Flight Section pilots at the A & AEE, Boscombe Down, England.

The Lancaster is the RAF's newest and best heavy bombardment airplane. Specific comments will be made for the Lancaster III flown at light weight. General comments in its comparison with the Mark II flown at heavy weight will be rendered.

2. Weight and C.G. Information.

The Lancaster III was loaded to approximately 45,000 pounds with normal c.g. and the Lancaster II was flown at 57,000 pounds and normal c.g.

3. Flight Characteristics.

a. Cockpit Layout.

The cockpit compartment, like earlier British heavy bombers, is arranged for a single pilot and a flight engineer, the engineer's station being directly behind the pilot while the usual co-pilot's position is primarily a passageway to the bomb aimer's "greenhouse" in the nose but is provided with a folding jump seat. The layout has been carefully planned for arrangement and simplification that is so desireable for night operations. All controls fall readily to hand and are easily identified. The trim controls operate in the correct plane and are conveniently located. Many automatic features add to the simplicity of operations of the Lancaster. The engine radiator shutters are automatically positioned and the mixture controls have been eliminated completely by using automatic carburetor settings selected from boost pressure. U.S. CONFIDENTIAL

b. Taxiing and Ground Handling.

Excellent taxiing and ground handling qualities are immediately discernable. Response to brakes and throttles is good and visibility is greatly improved over our large airplanes.

c. Take-off and Initial Climb.

At this light gross weight, take-off run was very short and initial climb good. The airplane was easy to control at the start of the ground run and control effectiveness becomes apparent at relatively low speed. No adverse vision characteristics were noted.

d. Climbs.

The indicated rate of climb at this weight was quite acceptable comparing closely with our heavy bombers.

e. Handling and Control at Various Speeds.

The controls are very satisfactory and quite well harmonized. At 130 IAS, they are all good; at medium speeds, they remain good, and at 250 IAS, the rudder remains proportionately light while the elevators become slightly heavy and the ailerons are also heavy particularly to the right.

f. Trim and Stability.

The trim tabs were found to be adequate for all conditions found during the flight.

The stability of the airplane is considered very commendable; longitudinally, it was stable with the dynamic oscillations being mild; directionally, it was stable with rapid dampening; laterally, it was neutral to slightly stable.

g. Stalls and Stall Warning.

The indicated stalling speed for the clean condition was 100 mph. This stall was very gentle with the airplane settling straight ahead. The stall with wheels and flaps down was at 78 IAS and was not as nice as the clean condition for the aileron stalled first and the airplane fell off to the right.

h. Maneuverability.

Maneuverability is excellent for the type. Radius of turn is short. Visibility for maneuvering is superior.

i. Control on Reduced Number of Engines.

The airplane was flown with the two right propellers

feathered and was found to handle extremely well under these conditions. It trimmed well at 150 IAS although full rudder bias was necessary at this speed.

j. Changes in Trim when Operating Landing Gear, Flaps, etc.

The trim changes encountered with the operation of landing gear, flaps, etc. are of reasonable magnitude and can be counteracted easily.

k. Noise and Vibration.

The level of noise and vibration in the cockpit was not excessive.

l. Comfort.

Cockpit comfort was considered highly satisfactory.

m. Vision.

In general, the vision was found to be exceptionally good. This quality has been more carefully designed for by the British in their heavy bombers than by our designers. Of course it is highly essential for night operations.

n. Approach and Landing

Approach and landing qualities were excellent at this weight. Vision was good for both conditions and ground run was short, with adequate control being in hand.

4. General Functioning.

a. Power Plant and Associated Equipment.

The Merlin 28 engines and associated equipment functioned properly during this flight. Different from many Rolls-Royce installations, these engines ran well with either positive or negative "g" applied to the airplane. Noteworthy too was that all engines started quickly and smoothly.

b. Hydraulic, Pneumatic & Electric Systems.

All systems operated properly and no trouble was encountered with automatic features.

c. Emergency Systems.

Emergency systems for both gear and flaps were pressure air systems and were not tried. Emergency egress facilities are well placed and of proper size.

5. Performance.

Boscombe Down performance reports on typical Lancasters are in the Flight Test Branch files.

The Lancaster II with Hercules engines flown at 57,000 pounds was found to be a slightly inferior airplane as far as handling qualities go but still a very satisfactory tactical airplane. Photographs of a Lancaster II and a Lancaster III are attached.

C. Conclusions.

1. The Lancaster is one of those rare airplanes in which the pilot feels at home immediately. This feature makes transitioning a pleasure by inspiring confidence.

2. Flying qualities were considered excellent and no bad features were found.

3. The airplane seems to handle well under increased load judging from the small changes noted in going from a Mark III at 45000 pounds to a Mark II at 57000 pounds.

D. Recommendations.

1. The vision qualities, automatic features, bomb-bay arrangement, and other excellent items of this airplane should be closely studied by our engineers for possible improvement of our own equipment.

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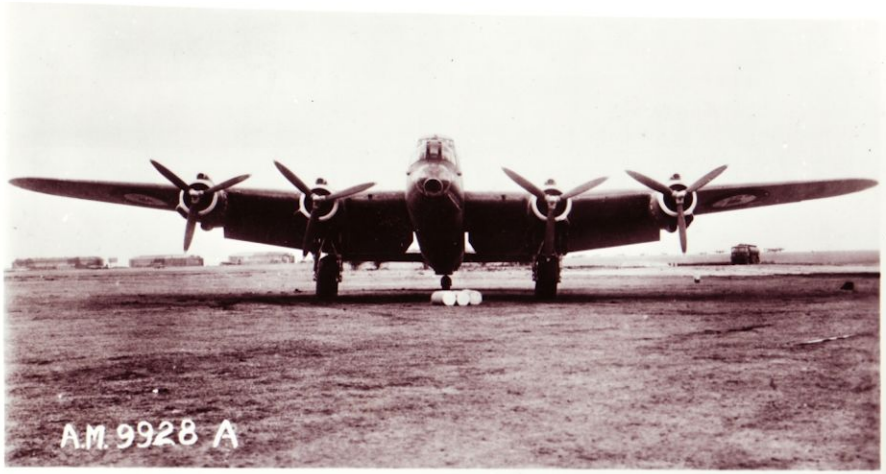

LANCASTER II

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