MDAC-266-W.F.-3-21-41-30M sets of 2

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WAR DEPARTMENT

AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON
Boeing B-17E Airplane, A.C. No. 41-2399 PFD-EC

Date November 22, 1941

SUBJECT: Acceptance Performance Tests

SECTION Flying Branch

SERIAL No. PHQ-M-19-1315-A

Contract No. W-535 AC-15677
Expenditure Order No. 425-4-37
Purchase Order No.

A. Purpose

1. To report on acceptance performance tests conducted at the manufacturer's plant on the B-17E airplane, A.C. No. 41-2399. Airplane equipped with four (4) Wright R-1820-65 engines with torque meters; exhaust driven turbo superchargers; 3-bladed constant speed propellers, blade design No. 6153A-18, blade angle range 21° - 88° at 42" radius. Landing gear retracted, wing flaps neutral, intercooler shutters wide open unless otherwise specified. Airplane loaded to design gross weight of 40,260 lbs., c.g. location 28.4%, except for range tests. De-icer equipment in place, marker beacon, radio compass, liaison and command set antennae in place. Airplane not camouflaged, armament in stowed position, (two .50 cal. guns in tail, two .50 cal. guns in top fuselage turret, and two .50 cal. guns in belly turret. Nose guns not in place but supporting brackets installed in windows and nose.)

B. Test Results

1. Level flight speeds; cowl flaps closed:

Altitude Ft.	True Speed MPH	B.H.P. per Engine	R.P.M.	Specific Fuel Consumption "Auto Lean" Lb/BHP/Hr	Specific Fuel Consumption "Auto Rich" Lb/BHP/Hr
25,200	317.0	1200	2500	-	-
25,200	297.0	1000	2300	-	-
25,200	261.0	750	2000	-	-
25,200	202.0	475	1750	-	-
15,000	289.0	1200	2500	-	-
15,000	271.5	1000	2300	-	.63
15,000	243.0	750	2000	.48	.525
15,000	228.0	650	1900	.44	.50
15,000	219.0	600	1800	.44	.495
15,000	210.0	550	1650	.44	.49
15,000	194.0	475	1550	.445	.49
15,000	178.0	415	1450	.45	.495
15,000	143.0	365	1350	-	-
5,000	2[illegible].0	1000	2300	-	-
5,000	2[illegible].0	650	1950	-	-

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Note: 1/2 cowl flap (10°) slowed airplane down 12 mph at 1000 bhp per engine at 15,000 ft.

2. Speeds in level flight at 15,000 ft. at 46,000 lbs. gross weight, c.g. location at 26%, cowl flaps closed:

True Speed MPH	BHP Per Engine	R.P.M.
222	650	1950
195	540	1650

3. Range at the guaranteed operating speed of 224 mph with alternate load consisting of design useful load plus additional fuel required to give 1700 gal. (at 6 lbs/gal) was 1990 miles at an average of 650 bhp per engine at 1900 rpm with mixture control "Auto Lean" at a specific fuel consumption of .44 lbs/bhp/hr.

4. Carburetor pre-heat check at 5000 ft. at 1950 rpm at 650 bhp per engine showed no carburetor temperature rise when the intercooler shutters were closed.

5. Climbs with turbo superchargers on to give 1000 bhp per engine up to critical altitude for 21,300 rpm on turbo. Climbs continued with turbos operating at 21,300 rpm.

Altitude Ft.	True Speed MPH	R.P.M.	Average B.H.P. per Engine	Rate of Climb Ft/Min.	Time of Climb Min.
0	127	2300	1000	1430	0
5000	137	2300	1000	1410	3.5
10,000	147	2300	1000	1350	7.1
15,000	159	2300	1000	1230	11.0
20,000	172	2300	1000	1050	15.4
25,000	184	2300	1000	850	20.6
28,000	194	2300	*1000	720	24.4
30,000	199	2300	** 970	610	27.4
35,000	208	2300	810	230	40.1
s/c 36,600	211	2300	770	100	50.0

*Critical altitude for 1000 bhp at 21,300 rpm on inboard turbos.
**Critical altitude for 1000 bhp at 21,300 rpm on outboard turbos.

6. Service ceiling on any combination of two engines with dead engine propellers feathered was 15,000 ft. or better at a calibrated airspeed of 118 mph. Live engines set for 1000 bhp at 2300 rpm, cowl flaps wide open. Dead engine cowl flaps closed.

With Nos. 1 and 2 engines dead and propellers feathered there is no hydraulic pressure to operate turbo regulators on live engines and co-pilot cannot maintain pressure for long with the wobble pump. 15,000 ft. can be maintained only so long as the co-pilot can maintain the hydraulic pressure. Pressure is available if the dead engine propellers are windmilling. The airplane will maintain level flight at 15,000 ft. with two dead engine propellers windmilling.

7. Poor visibility at time of landing and take-off tests made it impossible to obtain best performance. Results were so far below guarantees that the tests were not repeated. 4076 ft

   a. Total distance required to take off and clear a 50 ft. obstacle with 1/3 wing flap was 2150 ft. (Average of 2 trials).

   b. Total distance required to stop after landing over a 50 ft. obstacle (full flaps) was 2690 ft. (Best of two trials).

8. Determination of airspeed and altimeter errors with two type D-2 airspeed heads, one on each side of fuselage with static openings 19 inches out from fuselage and 31.5 inches aft from plastic nose section. Static lines interconnected but only right hand pressure line connected to cockpit indicator.

Barometric pressure at time of test was 30.07" Hg.

Indicated Airspeed MPH	Indicator Vs. Water Column MPH	Calibrated Airspeed MPH	Airspeed INSTALLation Error MPH	Altimeter Error Ft.
235	236	238	-2	-60
210	210	212	-2	-70
190	190	192	-2	-75
170	170	172	-2	-70
150	151	153	-2	-60
130	132	134	-2	-50

Altimeter error on landing at 76 mph indicated air speed with full flap was -30 ft.

9. Cooling data obtained in military power climb cooling test has been forwarded to the Power Plant Laboratory.

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