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WAR DEPARTMENT

AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON Douglas A-20B Airplane, A.C. No. 41-2671 PFB-BC

Date October 15, 1941

SUBJECT: Acceptance Performance Tests

SECTION: Flying Branch

Contract No. W-535 AC-15948

Expenditure Order No. 427-4-27

SERIAL No. PFB-M-19-1509-A

Purchase Order No.

3 Oct 1941

A. Purpose

1. To report on acceptance performance tests of the Douglas light bomber (A-20B) airplane, A.C. No. 41-2671, conducted at the manufacturer's plant. Airplane equipped with two (2) Wright R-2600-11 engines with torque meters, and three bladed, constant speed propellers, blade design No. 6193A-3, blade angle range 30° to 86° at 42" radius. Gross weight as tested was 20,098 lbs. and c.g., wheels down, was 18% m.a.c. Landing gear retracted, wing flaps neutral, carburetor cold and oil cooler shutters wired open unless otherwise stated. Radio antenna in place and gun openings covered.

B. Test results

1. High speed at wide open throttle in low blower at 5000 ft. with mixture auto rich and cowl flaps closed, was 333 mph at 2400 rpm at 1171 bhp per engine.

2. High speed at military power in high blower at critical altitude of 12,000 ft. with cowl flaps closed and mixture auto rich was 349 mph at 1400 bhp per engine at 2400 rpm.

3. Operating speed at 75% power in low blower at 5000 ft. was 278 mph at 2095 rpm and 1012 bhp per engine with cowl flaps 1/4 open. Corresponding range with mixture leaned manually to the guaranteed specific fuel consumption of .49 lbs/hp/hr is 673 miles on 400 gal. (at 6 lbs per gal.) of gasoline. Corresponding endurance is 2.42 hrs.

Corresponding range with mixture control in "auto lean" was 610 miles (.54 lbs/hp/hr).

Archives of M. Williams

4. Cruising data at 5000 ft., cowl flaps 1/4 open:

True Speed MPH	R.P.M.	Torque Meter BHP per Engine	% Rated Power
278	2095	1012	75
267	2095	912	67.5
253	1860	810	60

Note: Engine operation restricted between 1850 and 2050 rpm.

5. All level flight speeds are with the cowl flaps open to cool engines to a standard air temperature of 15° C. on the ground. Cowl flaps must be further opened to cool engines to the Air Corps standard air temperature of 38° C. on the ground (i.e., wide open cowl flap is needed to meet Air Corps cooling requirements at 75% power at 5000 ft.).

Loss of speed due to opening cowl flaps at 1012 bhp per engine at 2100 rpm at 5000 ft.:

Cowl Flap Position	Cowl Flap Opening Inches	True Speed MPH	Loss in Speed MPH
Closed	0	284	-
1/4 Open	1-5/8	278	6
1/2 Open	3-1/4	264	20
3/4 Open	4-7/8	249	35
Wide Open	6-1/2	236	48

6. Power required for level flight at 5000 ft. at 157 mph with cowl flaps wide open, was 560 bhp per engine at 1700 rpm.

7. Climb data: Cowl flaps wide open and mixture auto rich.

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	Altitude Ft.	True Speed MPH	R.P.M.	Torque Meter B.H.P. per Engine	Rate of Climb Ft/Min.	Time to Climb Min.
	0	153	2300	1260	2100	-
	5000	165	2300	1330	2100	2.4
	7000	170	2300	1360	2100	3.3
	9400	175	2300	1245	1820	4.6
	Shift to high blower:					
	12,200	180	2300	1260	1820	6.1
	15,000	185	2300	1135	1520	7.9
	20,000	193	2300	925	990	12.0
	25,000	202	2300	755	475	19.0
S/C	28,600	208	2300	640	100	33.3
A/C	29,600	210	2300	610	-	-

8. Airplane will maintain level flight on either engine at 14,700 ft. at 150 mph I.A.S. with cowl flap wide open, mixture auto rich, and throttle wide open with propeller set for 2300 rpm on live engine. Cowl flaps closed and propeller feathered on dead engine.

9. Total distance required to take off and clear a 50 ft. obstacle was 2130 ft. with cowl flaps wide open and wing flaps 0° (ave. of best 3).

10. Total distance required to stop after landing over a 50 ft. obstacle was 1910 ft. with wing flaps full down (ave. of best 2).

11. Carburetor pre-heat test at 3900 ft. pressure altitude at 860 bhp per engine at 1860 rpm at an outside air temperature of 17.5° C., carburetor air temperature with heat "off" was 25.5° C.; with heat "on" and cowl flaps closed, temperature was 45° C. At 1/2 cowl flap, carburetor temperature was 40° C.

12. Determination of airspeed and altimeter error with airspeed pitot head located 5" above the fin with static openings 6-3/4" ahead of the centerline of the fin spar. Barometric pressure at time of test was 29.88" Hg.

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Indicated Airspeed MPH	Indicator Vs. Water Column MPH	Calibrated Airspeed MPH	Airspeed Installation Error MPH	Altimeter Error Ft.
305	307	305	+2	+100
250	254	252	+2	+80
200	202	200	+2	+65
150	148	146	+2	+45

Altimeter error at point of contact on landing at 95 mph indicated airspeed, flaps down, was +10 ft.

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