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B-24D

CMDAC-266-WF-41-15-41-50M

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CLASSIFICATION CHANGED
TO Restricted
AUTH: AR 380-5 + 880 ATSC Off Dist
BY: JC 80-3
DATE: 4-4-46

WAR DEPARTMENT
AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON ELS-da
Consolidated B-24D, airplane, A.C. No. 40-696
Date May 22, 1942

SUBJECT: Acceptance Performance Tests

SECTION Flight Section

Contract No. W-535-AC-16005
Expenditure Order No. 425-4-36
Purchase Order No.

SERIAL No. PHQ-M-19-1401-A

A. Purpose

1. To report on acceptance performance tests conducted at the manufacturer's plant on the B-24D airplane, A.C. No. 40-696. Airplane equipped with four (4) Pratt & Whitney R-1830-43 engines with torque meters; exhaust driven turbo superchargers; three-bladed constant speed hydromatic propellers, blade design No. 6153-18. Landing gear retracted, wing flaps neutral, intercooler shutters wide open, cowl flaps in specified position. Airplane loaded to design gross weight of 41,000 pounds, c.g. location 25.8 percent and overload gross weights of 48,000 pounds, c.g. location 28.3 percent, and 56,000 pounds, c.g. location 29.8 percent. Deicer boots installed and all radio antenna in place. Exposed guns installed and in the aft position. Two .50 caliber guns in tail turret; two .50 caliber guns in top fuselage turret; two .50 caliber guns in belly turret. Nose guns not in place. Astradome in place.

B. Test Results

1. Level flight speeds; cowl flaps closed.

Altitude Ft.	Gross Weight lbs	True Speed MPH	BHP per Engine	RPM	Total Fuel Consumed lbs/hr Auto Lean	Total Fuel Consumed lbs/hr Auto Rich
10,000	41,600	270.	1200	2700	—	4050
10,000	at T.O.	263.5	1100	2550	—	3650
10,000	Down	241.	825	2300	—	2497
10,000	To	230.5	715	2200	1747	—
10,000	39,800	224.	660	2150	1460	—
	at 224 MPH					
10,000	41,000	207.5	550	2000	1084	—
10,000	at 207.5 MPH	185.5	440	1900	910	—
10,000	Down	184.5	440	1800	894	—
10,000	To	187.	440	1700	904	—

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1. Test Results (continued)

Altitude Ft.	Gross Weight lbs	True Speed MPH	BHP per Engine	RPM	Total Fuel Consumed lbs/hr Auto Lean	Total Fuel Consumed lbs/hr Auto Rich
10,000		160.	330	1700	751	—
10,000	39,800 at 192 MPH	192.	468	1600	902	—
25,000	41,600	310.	1200	2700	—	4050
25,000	at T.O.	301.5	1100	2550	—	3560
25,000		286.	935	2400	—	2960
25,000		274.	825	2300	—	2450
25,000		260.	715	2200	1645	—
25,000	Down	252.	660	2150	1376	—
25,000		235.	550	2000	1048	—
25,000		233.	550	1900	1048	—
25,000	To	233.	550	1800	1025	—
25,000		211.	440	1900	884	—
25,000		259.5	715	2200	—	2020
25,000	37,000 at 204 MPH	204.	440	1800	884	—
10,000	48,600	269.	1200	2700	—	4008
10,000	at T.O.	261.	1100	2550	—	3544
10,000		235.	825	2300	—	2520
10,000		223.	715	2200	1708	—
10,000	Down	216.	660	2150	1471	—
10,000		199.5	550	2000	1055	—
10,000	To	200.	550	1900	1045	—
10,000		201.	550	1800	1028	—
10,000		179.	440	1900	900	—
10,000	44,000 at Stall	Stall	330	1700	—	—
25,000	48,600	310.	1200	2700	—	4008
25,000	at T.O.	301.	1100	2550	—	3570
25,000		284.	935	2400	—	2960
25,000		270.	825	2300	—	2490
25,000	Down	253.5	715	2200	1615	—
25,000		244.	660	2150	1400	—
25,000	To	242.	660	2000	1292	—
25,000		241.5	660	1900	1280	—
25,000		221.5	550	1900	1048	—
25,000	43,000 at Stall	Stall	440	1900	892	—

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1. Test Results (continued)

Altitude Ft.	Gross Weight lbs	True Speed MPH	BHP per Engine	RPM	Total Fuel Consumed lbs/hr Auto Lean	Total Fuel Consumed lbs/hr Auto Rich
10,000	55,940	267.5	1200	2700	—	4040
10,000	at T.O.	260.	1100	2550	—	3540
10,000		245.	935	2400	—	2972
10,000		233.	825	2300	—	2460
10,000		226.	770	2250	—	2240
10,000	Down	219.	715	2200	1665	—
10,000		218.	715	2300	1711	—
10,000	To	218.	715	2100	1565	—
10,000		210.5	660	2150	1475	—
10,000		201.5	605	2050	1149	—
10,000		191.5	550	2000	1049	—
10,000		156.	440	1900	888	—
10,000	50,500 at 218 MPH	218.	715	2200	—	2045
25,000	55,940	307.	1200	2700	—	4028
25,000	at T.O.	294.5	1100	2550	—	3530
25,000		272.5	935	2400	—	2882
25,000		256.5	825	2300	—	2442
25,000	Down	239.	715	2200	1660	—
25,000		241.	715	2300	1655	—
25,000	To	239.	715	2100	1795	—
25,000		228.	660	2150	1445	—
25,000		Stall	605	2050	1171	—
25,000		307.	1200	2700	—	3950
25,000	50,500 at 296 MPH	296.	1100	2550	—	3560

* Fuel gages were of such type that intermediate weights could not be estimated.

2. Climbs with turbo superchargers on to give 1100 BHP per engine up to critical altitude of 25,000 feet for 22,000 RPM on turbo. Normal limiting turbo RPM is 21,300. For this particular test 21,300 RPM gave a critical altitude of approximately 23,000 feet.

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2. (continued)

	Altitude Ft.	T.O. Wt. lbs.	True Speed MPH	RPM	Average BHP per Engine	Rate of Climb-ft/min	Time of Climb - Min.
	0	41600	130	2550	1100	1540	0
	5,000	41400	139	"	"	1535	3.2
	10,000	41200	149	"	"	1470	6.6
	15,000	41000	159.5	"	"	1350	10.1
	20,000	40770	172	"	"	1220	14.0
	25,000	40415	185	"	"	980	18.4
	30,000	40100	196	"	—	520	25.3
S/C	34,000	39300	205	"	—	100	40.1
	0	48600	140	2550	1100	1125	0
	5,000	48340	149.5	"	"	1125	4.4
	10,000	48070	160.	"	"	1070	9.0
	15,000	47780	172	"	"	950	13.9
	20,000	47440	185	"	"	790	19.6
	25,000	47025	200	"	"	630	26.7
	30,000	46300	215	"	—	200	39.0
S/C	30,600	46100		"	—	100	43.0
	0	55,940	150	2550	1100	790	0
	5,000	55570	160	"	"	790	6.3
	10,000	55180	172	"	"	720	12.9
	15,000	54730	179	"	"	595	20.5
	20,000	54180	199	"	"	470	29.9
	25,000	53400	215	"	"	280	43.3

BHP could not be obtained above 25,000 feet due to oil congealing in torque meter lines. Climb data above 25,000 feet is at a constant turbo RPM of 22,000.

3. Ceiling with two right engines operating at normal rated power and two left engines dead, propellers feathered and throttle wide open, flaps up, was 9850 feet at a calibrated speed of 140 MPH. Use of 1/8 (6-1/2°) flaps did not alter the ceiling but indicated better controlability. (Gross Weight 41,000 pounds.)

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4. Take-off tests, concrete runway.

Weight	Flap Setting	No. of Trials	Total Distance required to Clear 50 ft. Obstacle	Length of T.O. Roll
41,000	1/2 (18°)	Best 3 out of 5	1770	1253
48,000	1/2 (18°)	Best 4 out of 4	2320	1630
56,000	1/2 (18°)	Best 2 out of 4	3240	2265

5. Determination of airspeed and altimeter errors with two type D-1 airspeed heads, one on each side of fuselage with static openings 29 inches out from fuselage and 4-1/2 inches foreward of line of intersection of nose and fuselage.

Indicated Airspeed MPH	Indicator vs. Water Col. MPH	Calibrated Airspeed MPH	Airspeed Installation Error MPH	Altimeter Error
230	229.5	229.5	0	+ 20
210	210	209.5	+ .5	+ 20
190	190	189.5	+ .5	+ 20
170	170.5	169.5	+1.0	+20
150	150.5	149.5	+1.0	+ 20
130	130	129.5	+ .5	+ 20

Prepared by EMIL L. SORENSON, 2nd Lt., A. C.
(Name)

Approved by GEORGE J. EPPRIGHT, Colonel, A.C.
Acting Chief, Flight Section

Concurrence:

Approved by F. O. CARROLL, Colonel, A. C.
Chief, Exp. Engr. Section

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