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WAR DEPARTMENT
AIR CORPS, MATERIEL DIVISION

(modified P-39K)

MEMORANDUM REPORT ON
Pursuit Single Engine P-39N-1, A.C. No. 42-4400 NRR-da

Date October 17, 1942

SUBJECT: Flight Tests

SECTION Flight

SERIAL No. FS-M-19-1487-A

Contract No.

Expenditure Order No. 430-4-87

Purchase Order No.

A. Purpose

- Report on flight tests of Bell P-39N-1 airplane at the manufacturer's plant. Airplane equipped with Allison V-1710-85 engine and three-bladed constant speed aero-propeller, blade design No. A-20-156-17, blade angle range 28° to 63°, at 42 inch radius. Gross Weight at take-off was 7274 pounds with c.g. at 29.0 percent, wheels up. Wheels up; wing flaps neutral; carburetor cold; mixture auto-rich unless otherwise specified; one exhaust stack per cylinder; one 37 mm. cannon, four .30 caliber wing guns, and two .50 caliber nose guns in place with a corresponding ammunition load of thirty rounds of 37 mm. ammunition, 300 rounds of .30 caliber ammunition per gun, and 250 rounds of .50 caliber ammunition per gun. Radios and radio mast and antenna in place with belly tank shackle without sway bracing in place.

*Tactical wt = 7810
Des. gross = 7630*

Horsepowers obtained from power curve V-1710-83 and 85 dated September 19, 1942 (2.23:1 propeller gear ratio; 9.6:1 blower gear).

B. Test Results

- High speeds, blast tubes closed.

Altitude	Speed MPH	RPM	b.h.p.	Man.Pr. "Hg.	Oil Cooler Shutter Position	Prestone Shutter Position
16,100	389.5	3000	1125	46.7	Flush	6 turns from W.O.
9,700	398.5	3000	1420	59.8	Flush	6 turns from W.O.
2,700	358.0	3000	1330	57.0	Flush	6 turns from W.O.
30,100	353.0	3000	655	26.7	Flush	6 turns from W.O.

*Crit. alt. max power
crit alt
W an emergency power ***

Airplane does not meet Air Corps cooling requirements at any of these powers.

Test with blast tubes open showed no measurable difference in speed from test with blast tubes closed

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- *Critical altitude for military rated power in level flight.
- **High speed at critical altitude for war emergency power; critical altitude for 57" Hg. was 10,900 feet. Speed at wide open throttle at 10,900 feet was 1.5 MPH less than speed at 9700 feet.

At 9700 feet and at manifold pressures above 55" Hg., mixture temperatures were within detonation range.

Prestone cooling in level flight does not meet Air Corps requirements with prestone shutters wide open except for low power operation.

Effect of shutter position on speed and prestone temperature:

Power	Shutter Position	Change in speed from speed obtained with shutters 6 turns from wide open.	Prestone Temp. °C	Change in prestone temp. from temp. obtained with shutters 6 turns from wide open.	Free Air Temp. °C	Pressure Altitude Ft.
1165	W.O.	-6	120.5	-5	+2	9135
950	W.O.	-5	117.0	-5	-7	15,160
570	W.O.	-6	96.0	-5	-35.5	29,254
1045	W.O.	-4	116.0	-3	-7	15,160
1045	Flush *	+5	125.0	+6	-7	15,160

*Flush position is 13 turns closed from wide open position.

2. Normal rated power and cruising speeds:

Altitude Ft.	Speed			Oil Cooler	Prestone	Mixture Setting
	MPH	RPM	b.h.p.	Shutter Position	Shutter Position	
16,100	369	2600	968	Flush	Flush	Auto-rich
16,100	335	2280	750	Flush	Flush	Auto-lean
16,100	311	2200	635	Flush	Flush	Auto-lean
16,100	302.5	2100	600	Flush	Flush	Auto-lean
16,100	286	1900	540	Flush	Flush	Auto-lean
16,100	261	1700	465	Flush	Flush	Auto-lean

Prestone cooling in level flight does not meet Air Corps requirements above 65 percent normal power with prestone shutters in the flush position. Airplane will meet Air Corps prestone cooling requirements when using normal power with prestone shutters open to 6 turns from wide open position.

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3. Climb data, prestone and oil cooler flaps wide open; blast tubes closed; mixture control in the auto-rich position. Throttle set for 50.5" Hg. at 3000 RPM or wide open when below. *initial set*

Altitude Ft.	Speed MPH	RPM	b.h.p.	Rate of Climb Ft/Min.	Time of Climb Min.
S.L.	156	3000	1170	3320	0
5000	169	3000	1200	3600	1.45
10,000	182	3000	1230	3865	2.79
11,000	185	3000	1235	(3920)	3.05
15,000	194	3000	1060	3340	4.15
20,000	205	3000	885	2630	5.83
25,000	216	3000	745	1940	8.04
30,000	227	3000	630	1260	11.21
35,000	241	3000	--	580	16.88
S/C 38,500	--	3000	--	100	29.20
A/C 39,400	--	3000	--	--	--

Prestone temperature does not meet Air Corps requirements in climb. High prestone temperature observed in climb was 136°C at 11,000 feet at 1235 b.h.p. with a free air temperature of +4°C.

4. Determination of airspeed indicator and altimeter installation errors.

Indicated Airspeed MPH	Indicator vs. Water Column MPH	Calibrated Airspeed MPH	Airspeed Installation Error MPH	Altimeter Installation Error at Sea Level (Ft.)
330	331	339.5	-8.5	-85
300	300.5	306.	-5.5	-75
275	274.5	278.	-3.5	-70
250	248.	252	-4.0	-60
225	225.	226.	-1.0	-50
200	200.	200.	0	-45
175	174.	174.	0	-35
150	149.5	148.	+1.5	-30

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