

WAR DEPARTMENT
AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON

Lockheed YP-38 Airplane, A.C. No. 39-689

RLF-BC

Date February 12, 1941

SUBJECT: Flight Test

SECTION.....Flying Branch.....

Contract No. AC-12523

SERIAL No. PHQ-M-19-1191-A

Expenditure Order No. 431-4-21

Purchase Order No.

A. Purpose

1. Flight test of the Lockheed YP-38 airplane equipped with Allison V-1710-27 and 29 engines and constant speed propellers, blade design No. 615CC1.5-6. Airplane flown at full military load of 13,500 lbs., c.g. at 29.44% m.a.c. Radio antenna in place, gun openings covered, wheels up, wing flaps neutral.

B. Factual Data

1. Speeds with original cooling air scoops on turbos, prestone and oil cooler shutters in the flush position:

Altitude Ft.	True Airspeed MPH	BHP/Engine	R.P.M.	Mixture Control
5000	345	1150	3000	Auto rich
5000	334	1000	2600	Auto rich
5000	301	750	2280	Auto lean
5000	262	500	2000	Auto lean
20,000	390	1150	3000	Auto rich
20,000	381	1000	2600	Auto rich
20,000	349	750	2280	Auto lean
20,000	308	500	2000	Auto lean

2. With new smaller type of cooling air scoops on turbos, mixture automatic rich, prestone and oil cooler shutters in the flush position:

20,000	393	1150	3000
20,000	384	1000	2600

Note: All level flight runs made with prestone and oil cooler shutters in the flush position. Airplane will not meet Air Corps cooling requirements with shutters in this position.

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3. Climb data - prestone and oil cooler shutters wide open:

Altitude Ft.	Rate of Climb Ft/Min	BHP/Engine	R.P.M.	True Air- speed, MPH	Time Min.
0	3200	1135	3000	161	0
5,000	3200	1135	3000	171	1.56
10,000	3130	1130	3000	182	3.13
15,000	2830	1125	3000	193	4.8
20,000	2300	965	2600	206	6.8

Altitude obtained in 6 mins is 18,100 ft. using military power for 5 mins.

4. Fuel consumption at 341 mph at 2280 rpm and 710 bhp per engine, mixture automatic lean, was 128 gal/hr. At the above operating condition the endurance on a normal gasoline load of 230 gal. is 1.8 hr., range 610 mi.
5. Since the airplane was well within the required 2200 ft. for take-off and landings over a 50 ft. obstacle, no attempt was made to accurately measure them, but a check on two take-offs and one landing showed:
- a. Take-off distance, no flaps - 1675 ft. over 50 ft. obstacle
 - b. Take-off distance, flaps half extended - 1500 ft. over 50 ft. obstacle
 - c. Landing distance, full flaps - 1700 ft. over 50 ft. obstacle
6. Airspeed and altimeter installation error with static holes located on centerline and 18" below fuselage and 13" forward of nose wheel strut:

Indicated Airspeed MPH	Indicator Vs. Water Column MPH	Calibrated Airspeed MPH	Airspeed Installation Error MPH	Altimeter Installation Error Ft.
160	160	166.5	+6.5	0
200	200	205	+5	0
240	240	243	+3	0
280	280	282	+2	0
310	310	312	+2	0

7. One high speed point of 401.5 mph was obtained at 27,100 ft. at 1023 bhp/engine at 2900 rpm. *guaranteed @ 20,000'*

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C. Conclusions

1. Horse power figures listed in this report were obtained from power curves. It is the opinion of the Flight Test Unit that the horse power as indicated by the chart is less than the power actually developed (by approximately 50 h.p.) for normal and military power ratings at 20,000 ft.
2. Carburetor air temperatures are excessive at high outputs of the turbo supercharger due to insufficient intercooling, and it is believed that the usual correction to chart horse power (0.87 power) does not hold true under those conditions. It is also possible that there is a slight increase in power due to the automatic carburetor supplying a leaner mixture at the excessive carburetor air temperatures encountered on test.

D. Recommendations

1. A torque meter would offer the best solution, but since none is available, it is recommended that an Allison engine be run on the torque stand under conditions similar to flight tests, or it may be possible to check the conclusions on the YP-43 airplane which is equipped with a torque meter and intercooler shutters to vary the carburetor temperature.

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