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**ARMY AIR FORCES  
MATERIEL CENTER**

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**MEMORANDUM REPORT ON  
Bell P-39D-1, A.C. No. 41-28378**

Date **December 18, 1942**

**SUBJECT: Critical Altitude and High Speed  
With two types of Intake Manifolds.**

**SECTION Flight**

Contract No. ....

Expenditure Order No. **430-4-62**

**SERIAL No. FS-M-19-1521-A**

Purchase Order No. ....

**A. Purpose**

- To report results of flight tests on the P-39D-1 airplane, A.C. No. 41-28378, to determine the high speed and critical altitude with the streamlined manifold consisting of "T" manifolds, Dwg. No. DRIMI-42790, pipe manifolds, Dwg. DRW-L-42791, and port manifolds, Dwg. Nos. 36086 and 36085; and also with the standard manifold with "T" screens installed consisting of "T" manifolds, Dwg. No. 40041, pipe manifolds, Dwg. No. 34167, and port manifolds, Dwg. Nos. 36086 and 36085. Airplane equipped with Allison V-1710-35 engine and with three-bladed constant speed propeller, Dwg. No. 614-lcl.5-21. Gross weight as reported by the Aircraft Laboratory was approximately 7450 pounds, at 30.9 percent m.a.c., wheels up. All tests with a 20 mm cannon in nose, two .50 caliber guns in the fuselage and four .50 caliber guns in the wings, radio antenna in place, and no sway braces installed.

Power data obtained from Allison power curve for V-1710-69, 73, 35, and 39 engines dated September 29, 1942, for all tests with the streamlined manifold; power data for tests with the manifold with "T" screens was obtained from Allison power curve for the V-1710-35 and 39 engines dated December 12, 1941.

**B. Test Results**

- High speed at 12,750 feet at 2970 RPM at wide open throttle.

Intake Manifold	True Speed MPH	Manifold Pressure "Hg.	b.h.p. from Chart
Streamlined Manifold	370	45.9	1162
Manifold with "T" Screens	369	45.4	1172

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Critical altitude for 1150 b.h.p. at 2970 RPM from power curve data was 13,000 feet for the streamlined manifold and 13,300 feet for the manifold with the "T" screens. However, it is believed that either one or both power curves are at fault and that the actual critical altitude with the streamlined manifold is 250 feet higher than the critical altitude with the manifold with the "T" screens installed.

WWIIaircraftperformance.org

Concurrence:

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