ARMS AIR FORCES
MATERIEL COMMAND

MEMORANDUM REPORT ON
Pursuit Single Engine P-39Q-5 Airplane, AAF No. 42-19615

SUBJECT: Flight Tests

SECTION Flight

SERIAL No. ENG-17-1631-A

A. Purpose

1. To report on flight tests of the Bell P-39Q-5 airplane, AAF No. 42-19615 at Wright Field.

B. Factual Data and Test Results

1. The airplane is equipped with an Allison V-1710-85 engine and three bladed constant speed Aero-propeller, blade design No. A-20-156-17 with a high angle of 63° and low angle of 28° at the 1.2 inch station.

Horsepowers were obtained from the V-1710-31, 83, 85 power curves dated 9-29-42 with 2.0:1 and 2.25:1 prop gear ratio and 9.6:1 super charger gear ratio.

2. The airplane was tested in the following combat condition. Take-off gross weight was 7,671 pounds with the c.g. at 30.02% M.A.C. wheels up and 29.12% M.A.C. wheels down. Airplane ballasted for 10 additional gallons of fuel, to give 120 gallons total, by addition of 60 pounds ballast in cockpit. Also ballasted for 200 rounds (60 lbs.) in each of two caliber .50 nose guns, 300 rounds (90 lbs.) in each of two externally mounted caliber .50 wing guns, and 30 rounds (60 lbs.) in the 37 mm nose cannon. All normal combat provisions and equipment, and belly tank shackle without sway bracing in place.

Wheels up, wing flaps neutral, carburetor cold, mixture auto-rich unless otherwise specified.

3. High Speed in Level Flight:

Throttle open to 57° Hg at 3000 RPM or wide open when below.
Oil shutters in flush position. Coolant shutters open to 2.9 inches of gap from flush position, corresponding to approximately 6 turns from wide open, on all test runs. The dashed line on the speed versus altitude curve on page A-1 represents the true speed that would be obtained if the coolant shutters were closed down to give a limiting standard coolant temperature of 125°C.
Flight Test Branch
Memo Report ENO-19-1631-A
4 August 1943

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Speed</th>
<th>BHP From chart</th>
<th>Manifold Pressure &quot;Hg</th>
<th>Rate of climb Ft./min.</th>
<th>Time to climb Min.</th>
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*Critical Altitude in War Emergency Power
Climb - 57" Hg at 3000 RPM

The airplane does cool to a Standard Day but will not cool to an Army Hot Day at any of the above powers, even with the coolant shutters wide open, except above 27,000 feet.

With the oil shutters in flush position the oil cools to a Standard Day but does not cool to an Army Hot Day; using 95°C as the limiting temperature.

4. Climb data:

Throttle set for 57" Hg at 3000 RPM or wide open when below.
Oil shutters and coolant shutters wide open.

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*Critical Altitude War Emergency Power
57" Hg at 3000 RPM
The airplane will cool to a Standard Day with the coolant shutters wide open, but will not cool to an Army Hot Day at all altitudes.

Sawtooth climbs were run to determine the affect of closing down the coolant shutters on temperature and rate of climb. Due to overheating it was not possible to obtain accurate data on the variation of temperature, but test results showed that the effect of closing down the shutters was apparently less than 60 ft/min when shutters were closed to flush position.

The oil will cool to a Standard Day with shutters wide open but will not cool to an Army Hot Day at any altitudes.

5. Determination of Airspeed Indicator and Altimeter Installation Error:

<table>
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<tr>
<th>Indicated Airspeed MPH</th>
<th>Indicated vs Water Column MPH</th>
<th>Calibrated Airspeed MPH</th>
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<th>Altimeter Installation Error at Sea Level Ft.</th>
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Location of the pitot head is shown on page A-4.

6. Tests are now being conducted with the external wing guns removed and the airplane ballasted back to 7871 pounds. Results will be forwarded upon completion of the tests.

Note: 4 Summary sheets included.

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CONFIDENTIAL
COOLANT POSITION TO GIVE 125° STANDARD TEMP.

SPEED WITH COOLANT SHUTTERS CLOSED TO GIVE 125° STANDARD TEMP.