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WAR DEPARTMENT
AIR CORPS, MATERIEL DIVISION

MEMORANDUM REPORT ON
Republic P-47B, AC No. 41-5931

SUBJECT: Performance Tests

SECTION: Flight

SERIAL No. FS-K-19-1469-A

Date September 7, 1942

A. Purpose

1. To report results of flight tests conducted to determine the rate of climb and the level flight critical altitude at military power on the P-47B airplane AC No. 41-5931. This airplane equipped with Pratt & Whitney R-2800-21 engine with turbo supercharger and four-bladed Curtiss electric constant-speed propeller with cooling cuffs; blade design No. 714-102-12; blade angle range 23° to 58°. Gross weight as tested was 12,560 pounds at 32 percent m.a.c., wheels up. Radio mast and antenna in place and eight .50 caliber machine guns installed. All tests with wheels up, wing flaps up, and with the mixture automatic rich.

No torque meter was installed on this airplane so that power data was not obtained. However, from torque meter data on other P-47B airplane tests, military rated power of 2000 b.h.p. at 2700 RPM would be obtained at approximately 52.2° Hg. at 25,000 feet on this airplane.

B. Test Results

1. Critical altitude in level flight for approximately 2000 b.h.p. at 2700 RPM at 13,250 turbo RPM with cowl flaps, oil cooler, and intercooler flaps flush and throttle wide open with turbo on to give 13,250 turbo RPM.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Critical Altitude</th>
<th>True Speed</th>
<th>Manifold Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original duct without dust screen</td>
<td>26,800</td>
<td>429</td>
<td>52.3</td>
</tr>
<tr>
<td>New duct with dust screen inst.</td>
<td>24,900</td>
<td>419</td>
<td>52.4</td>
</tr>
<tr>
<td>New duct with dust screen by-passed</td>
<td>25,200</td>
<td>421</td>
<td>52.6</td>
</tr>
<tr>
<td>New duct with dust screen removed</td>
<td>25,600</td>
<td>423</td>
<td>52.8</td>
</tr>
</tbody>
</table>

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Archives of M. Williams
2. Climb data obtained with throttle wide open, and turbo on to give 52.2" Hg. or 18,250 turbo RPM. Cowl flaps, oil cooler flaps and intercooler flaps wide open. Original intake duct without dust screens installed.

<table>
<thead>
<tr>
<th>Altitude (Ft.)</th>
<th>True Speed (MPH)</th>
<th>True Speed (RPM)</th>
<th>Manifold Pressure (&quot;Hg.)</th>
<th>Turbo RPM</th>
<th>Rate of Climb (ft/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15,000</td>
<td>207</td>
<td>2700</td>
<td>51.8</td>
<td>14,050</td>
<td>2330</td>
</tr>
<tr>
<td>20,000</td>
<td>233</td>
<td>2700</td>
<td>52.0</td>
<td>16,150</td>
<td>2150</td>
</tr>
<tr>
<td>25,000</td>
<td>245</td>
<td>2700</td>
<td>52.2</td>
<td>16,250</td>
<td>2000</td>
</tr>
<tr>
<td>30,000</td>
<td>252</td>
<td>2700</td>
<td>49.2</td>
<td>16,250</td>
<td>1900</td>
</tr>
<tr>
<td>35,000</td>
<td>265</td>
<td>2700</td>
<td>41.0</td>
<td>13,250</td>
<td>1190</td>
</tr>
</tbody>
</table>

*Climps up to 25,000 feet were made at 15 MPH above best climbing speed and this was gradually reduced so that best climbing speed was reached at 35,000 feet. This was done in order to cool the engine and the loss in rate of climb at 25,000 feet was approximately 40 feet/minute. The engine apparently cooled satisfactorily at the speeds given above.

3. A series of climbs were conducted in order to determine the effect of cowl flap position on cylinder head temperature from the pilot's cockpit temperature gage.

a. Climbs at best climbing speed of 155 MPH I.A.S. at 2500 RPM and 42" Hg. were made to 30,000 feet from stabilized level flights at 10,000 feet with 1/2, 3/4, and wide open cowl flap positions. Head temperature at 25,000 feet was 10°C hotter at 1/2 cowl flap and 10°C hotter at 3/4 cowl flap than it was with cowl flaps wide open. Slight buffeting at wide open flap disappeared below 3/4 cowl flap setting.

b. At an increased climbing speed of 170 MPH I.A.S., climbs were repeated at 1/2 and wide open cowl flap positions. Cylinder temperature was only 10°C hotter at 1/2 flap than with cowl flaps wide open. This increased climbing speed caused a 10°C decrease in cylinder head temperature at the wide open cowl flap setting.
Flight Section
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September 7, 1942

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