ARMY AIR FORCES
MATERIEL CENTER

MEMORANDUM REPORT ON
Pursuit Single Engine P-40N, A.C. No. 42-9367

SUBJECT: Flight Tests

SECTION Flight

SERIAL No. FS-M-13-1535-A

Date: January 30, 1943

A. Purpose.

1. Report on flight tests of Curtiss P-40N (F-44K) armed to 7413 pounds with the same drag conditions as P-40N airplane at the manufacturer's plant. Airplane equipped with Allison V-1710-81 engine and 16 three-bladed 11 feet 6 inches constant speed electric propeller, blade design No. 3250-248, blade angle range 24.5° to 28.1° at 42 inch radius. Gross weight at takeoff was 7413 pounds with c.g. location at 30.15 percent m.c., wheels up, wheels down, engine neutral, carburetor cold, mixture auto-rich, unless otherwise specified, one flame dampening stacks per cylinder, four .50 caliber wing guns with blast tubes taped and 230 rounds of .50 calibre ammunition per gun. Radios and radio mast and single strand antenna in place with belly tank in place. Equipped with experimental aluminum alloy radiators, Dec. 1939, Serial No. 9-R, and Dec. 1939, Serial No. 10-R. No rear view mirror, no external gun peep sight. Horsepower obtained from power curve V-1710-81, 83, and 87, dated October 23, 2, 1942 (2:1 propeller gear ratio; 3:1 blower gear).

B. Tests Results.

1. High speeds, cowl flaps in the neutral position.

<table>
<thead>
<tr>
<th>Altitude (Feet)</th>
<th>Airspeed (MPH)</th>
<th>RPM</th>
<th>b.h.p.</th>
<th>Intake</th>
<th>Man. Pr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2960</td>
<td>323</td>
<td>3000</td>
<td>1125</td>
<td>910</td>
<td>Part</td>
</tr>
<tr>
<td>2950</td>
<td>314</td>
<td>3000</td>
<td>1115</td>
<td>910</td>
<td>Part</td>
</tr>
<tr>
<td>10550</td>
<td>314</td>
<td>3000</td>
<td>1125</td>
<td>910</td>
<td>Part</td>
</tr>
<tr>
<td>*10550</td>
<td>378</td>
<td>3000</td>
<td>1430</td>
<td>950</td>
<td>Wide</td>
</tr>
<tr>
<td>**17300</td>
<td>371</td>
<td>3000</td>
<td>1125</td>
<td>950</td>
<td>Wide</td>
</tr>
<tr>
<td>29700</td>
<td>348</td>
<td>3000</td>
<td>706</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Critical altitude for military rated power in level flight.
**Critical altitude for war emergency power in level flight.
2. Normal rated power and cruising speeds, cowl flaps in the neutral position.

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Airspeed MPH</th>
<th>RPM</th>
<th>b.h.p.</th>
<th>Throttle Position</th>
<th>Mixture Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td>17,130</td>
<td>356</td>
<td>2600</td>
<td>1005</td>
<td>Wide</td>
<td>Auto-rich</td>
</tr>
<tr>
<td>17,130</td>
<td>327</td>
<td>2280</td>
<td>800</td>
<td>Part</td>
<td>Auto-lean</td>
</tr>
<tr>
<td>17,130</td>
<td>307</td>
<td>2200</td>
<td>700</td>
<td>Part</td>
<td>Auto-lean</td>
</tr>
<tr>
<td>17,130</td>
<td>285</td>
<td>2100</td>
<td>560</td>
<td>Part</td>
<td>Auto-lean</td>
</tr>
<tr>
<td>17,130</td>
<td>263</td>
<td>1900</td>
<td>600</td>
<td>Part</td>
<td>Auto-lean</td>
</tr>
<tr>
<td>17,130</td>
<td>255</td>
<td>1700</td>
<td>500</td>
<td>Part</td>
<td>Auto-lean</td>
</tr>
</tbody>
</table>

3. Climb data, cowl flaps wide open, mixture control in the auto-rich position. Throttle set for 57 inches Hg. at 3000 RPM or wide open when below.

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Airspeed MPH</th>
<th>RPM</th>
<th>b.h.p.</th>
<th>Rate of Climb Ft./Min.</th>
<th>Time of Climb Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Level</td>
<td>156.5</td>
<td>3000</td>
<td>1290</td>
<td>3375</td>
<td>0</td>
</tr>
<tr>
<td>5,000</td>
<td>156.5</td>
<td>3000</td>
<td>1290</td>
<td>3375</td>
<td>1.59</td>
</tr>
<tr>
<td>10,000</td>
<td>174</td>
<td>3000</td>
<td>1330</td>
<td>3375</td>
<td>2.21</td>
</tr>
<tr>
<td>15,000</td>
<td>185.5</td>
<td>3000</td>
<td>1305</td>
<td>2630</td>
<td>2.77</td>
</tr>
<tr>
<td>20,000</td>
<td>185.5</td>
<td>3000</td>
<td>1305</td>
<td>2630</td>
<td>4.11</td>
</tr>
</tbody>
</table>

*Critical altitude for war emergency power in climb.

4. Climb data. Cowl flaps wide open, mixture control in the auto-rich position, throttle set for 50.5 inches Hg. at 3000 RPM or wide open when below.

<table>
<thead>
<tr>
<th>Altitude</th>
<th>Airspeed MPH</th>
<th>RPM</th>
<th>b.h.p.</th>
<th>Rate of Climb Ft./Min.</th>
<th>Time of Climb Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Level</td>
<td>155</td>
<td>3000</td>
<td>1290</td>
<td>3375</td>
<td>0</td>
</tr>
<tr>
<td>5,000</td>
<td>155</td>
<td>3000</td>
<td>1245</td>
<td>3220</td>
<td>1.56</td>
</tr>
<tr>
<td>10,000</td>
<td>174</td>
<td>3000</td>
<td>1305</td>
<td>3375</td>
<td>3.07</td>
</tr>
<tr>
<td>15,000</td>
<td>180</td>
<td>3000</td>
<td>1305</td>
<td>2630</td>
<td>3.19</td>
</tr>
<tr>
<td>20,000</td>
<td>186</td>
<td>3000</td>
<td>1305</td>
<td>2630</td>
<td>4.72</td>
</tr>
<tr>
<td>25,000</td>
<td>191</td>
<td>3000</td>
<td>1305</td>
<td>1970</td>
<td>6.89</td>
</tr>
<tr>
<td>30,000</td>
<td>197</td>
<td>3000</td>
<td>1305</td>
<td>1400</td>
<td>9.39</td>
</tr>
<tr>
<td>35,000</td>
<td>203</td>
<td>3000</td>
<td>1305</td>
<td>890</td>
<td>14.33</td>
</tr>
<tr>
<td>S/C</td>
<td>32,200</td>
<td>3000</td>
<td>1305</td>
<td>890</td>
<td>22.52</td>
</tr>
<tr>
<td>A/C</td>
<td>32,200</td>
<td>3000</td>
<td>1305</td>
<td>890</td>
<td>37.37</td>
</tr>
</tbody>
</table>

*Critical altitude for military power in climb.
5. Determination of airspeed indicator and altimeter installation errors. Pitot static holes located 21-1/4 inches in from left wing tip and 17-1/4 inches back from leading edge.

<table>
<thead>
<tr>
<th>Indicated Airspeed</th>
<th>Indicator vs. Water Column</th>
<th>Calibrated Airspeed</th>
<th>Airspeed Installation Error</th>
<th>Altimeter Installation Error at Sea Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>330</td>
<td>328.5</td>
<td>337.5</td>
<td>-9</td>
<td>-280</td>
</tr>
<tr>
<td>300</td>
<td>300</td>
<td>308</td>
<td>-8</td>
<td>-205</td>
</tr>
<tr>
<td>275</td>
<td>274</td>
<td>283</td>
<td>-9</td>
<td>-165</td>
</tr>
<tr>
<td>250</td>
<td>249</td>
<td>256</td>
<td>-7</td>
<td>-120</td>
</tr>
<tr>
<td>225</td>
<td>225</td>
<td>231</td>
<td>-6</td>
<td>-120</td>
</tr>
<tr>
<td>200</td>
<td>190</td>
<td>204.5</td>
<td>-5.5</td>
<td>-100</td>
</tr>
<tr>
<td>175</td>
<td>174</td>
<td>173</td>
<td>-3</td>
<td>-85</td>
</tr>
<tr>
<td>150</td>
<td>140</td>
<td>157.5</td>
<td>-4.5</td>
<td>-70</td>
</tr>
<tr>
<td>130</td>
<td>130</td>
<td>138.5</td>
<td>-2.5</td>
<td>-60</td>
</tr>
</tbody>
</table>

6. Complete cooling tests were not run on this airplane, however, it was found that pressurer temperatures did not meet Air Corps cooling requirements in climb. Highest pressurer temperature observed in war emergency power climb was 105°C at 8000 feet at 1480 b.h.p. with a free air temperature of -12°C. Highest pressurer temperature observed in military power climb was 105°C at 12,000 feet at 1220 b.h.p. with a free air temperature of -12°C.

The oil cooler was not equipped with a 40-pound spring to allow all the oil to go through the oil cooler, however, indications are that oil temperatures would not meet Air Corps cooling requirements.

Concurrence:

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