PERFORMANCE TEST OF SPAD 13
EQUIPPED WITH 220 H. P. WRIGHT ENGINE

(FLIGHT TEST BRANCH PERFORMANCE TEST REPORT NO. 60)

Prepared by Engineering Division, Air Service
McCook Field, Dayton, Ohio
April 27, 1921
PERFORMANCE TEST OF SPAD 13 EQUIPPED WITH 220 H.P. WRIGHT ENGINE
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OFFICIAL PERFORMANCE TEST - SUMMARY OF RESULTS.

No.: P-154.
Type: I.
Engine: 220 H. P. Hispano-Suiza.
Propeller: S. C. No. 109778.
Equipped as: Single-seater pursuit.

APR. 27, 1921.

Weight empty (including water): 1,464 pounds.
Armament and equipment: 185 pounds.
Crew: 180 pounds.
Gasoline: 177 pounds.
Oil: 30 pounds.
Weight loaded: 2,036 pounds.
Weight per square foot: 9.5 pounds.
Weight per horsepower: 9.16 pounds.
Fineness: 104.

<table>
<thead>
<tr>
<th>Standard altitude in feet</th>
<th>Climb.</th>
<th>Speed.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time in min.</td>
<td>R. p. m.</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>2,040</td>
</tr>
<tr>
<td>6,000</td>
<td>6.5</td>
<td>2,040</td>
</tr>
<tr>
<td>10,000</td>
<td>11.5</td>
<td>2,040</td>
</tr>
<tr>
<td>15,000</td>
<td>23</td>
<td>2,000</td>
</tr>
<tr>
<td>20,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25,000</td>
<td>22.5</td>
<td></td>
</tr>
<tr>
<td>30,000</td>
<td>42.5</td>
<td></td>
</tr>
</tbody>
</table>

1 Service ceiling. 2 Absolute ceiling.

Endurance, full throttle at 10,000 feet (including climb), 2 hours 30 minutes.
Minimum speed at sea level (lowest throttle), 65 m. p. h.
Landing speed, 59 m. p. h.

PILOT'S OBSERVATIONS ON SPAD 13.

This airplane taxies very easily even in a high wind, and has no tendency to turn in either direction on the ground. It should be taxied with the control stick held forward to lessen the weight on the tail skid. The tail skid is set too straight and has broken on two different occasions while taxying over rough ground.

It is a difficult airplane to take-off because of the tendency to swing to the right immediately upon opening the throttle, and if given left rudder too fast will swing to the left. In order to make a good fast take-off it is necessary to push the control stick slightly forward to raise the tail from the ground. This feature is noticeable after having flown other pursuit airplanes of approximately the same power.

In flight the airplane is very steady, but requires a good deal of left rudder, as the engine torque is very pronounced. It is tail heavy flying level, and also climbing with wide-open throttle, but this tail heaviness is not so pronounced above 15,000 feet.

The cockpit is very roomy, although the rudder bar is set too close to the pilot and tires the legs in a long flight. It is a very warm and comfortable airplane to fly at altitude or on cold days, but not on warm days or low flying with wide-open throttle, such as contact patrol.

The airplane maneuvers easily and shows no tendency to spin in very tight banks. The visibility is good to either side and above the top wing, but is blind straight ahead and below.

The constant noise of the geared engine is very annoying and at altitudes above 16,000 feet the engine operates badly. The engine is very susceptible to temperature changes in a glide and cools quickly, so that the pilot must control his shutters constantly in changing altitude.

The engine is not very accessible for maintenance, and the installation could be improved.

This airplane lands easily, shows no tendency to turn on the ground, and stops short owing to the heavy tail. Even when landed tail high or on a rough field it does not show any tendency to nose over.

LOUIS G. MEISTER, Test Pilot.

DESCRIPTION OF AIRPLANE.

DIMENSIONS.

Over-all span: 26 feet 3½ inches.
Over-all length: 20 feet 4 inches.
Over-all height: 7 feet 6½ inches.
Height at hub of propeller above ground: 4 feet.
In flying position: No propeller or engine in airplane.
At rest: ————. WINGS.

Wing curve: Unknown.
Sweep back: None.
Dihedral, degrees: None.
Stagger: 1°.
Gap: 3 feet 10 inches.
Total area, including ailerons: 227 square feet.

UPPER WING.

(Including center section.)

Span: 26 feet 3½ inches.
Chord: 4 feet 7½ inches.
Area, with ailerons: Unknown.
Incidence, degrees: Upper, 14°; lower, 1°.
Span (from center section to wing tip): 13 feet 2 inches.

LOWER WING.

Span: 26 feet 3½ inches.
Chord: 4 feet 7½ inches.
Area: ————.
Incidence, degrees: 1°.
Span (from fuselage to wing tip): 11 feet 2½ inches.
AILERONS OR FLAPS.
Number: 2.
Arrangement: On upper wing only.
Upper wing:
Length: 7 feet 3½ inches.
Chord: 1 foot 7¼ inches.
Area: ---.
Lower wing:
Length: None.
Chord: None.
Area: ---.
Total area: ---.
Distance from longitudinal axis of airplane to center of aileron: 9 feet 4½ inches.

CENTER SECTION.
Span: No center section on this airplane.
Chord (maximum): ---.
Area: ---.
Contents: Gravity gasoline tank in upper wing.

STABILIZER.
Span (maximum): 10 feet 2 inches.
Chord (maximum): 2 feet 3½ inches.
Area: ---.
Setting: ---.
Section: ---.

ELEVATOR.
Span (maximum): 10 feet 2 inches.
Chord (maximum): 1 foot 8½ inches.
Area: ---.
Distance from leading edge of elevator to center of gravity of airplane: Center of gravity unknown.

RUDDER.
Height (maximum): 3 feet 10½ inches.
Chord (maximum): 2 feet 2 inches.
Area: ---.
Distance from rudder hinge to center of gravity of airplane: ---.

FIN.
Height: 2 feet ½ inch.
Width (maximum): 3 feet 11½ inches.
Area: ---.

FUSELAGE.
Maximum cross-section shape: ---.
Maximum cross-section area: ---.
Maximum cross-section height: 2 feet 2 inches.
Maximum cross-section depth: 3 feet 2 inches.
Distance of maximum section from leading edge, lower plane: 3 feet 10 inches.

LANDING GEAR.
Number of wheels: 2.
Tread: 4 feet 10½ inches.
Shock-absorbing system: Rubber cord.
Braking device: Tail skid.
Wheels ahead of center of gravity: Unknown.

DISTRIBUTION OF WEIGHTS.
[By pounds.]
Weight empty (with water): 1,464.
Armament and equipment: 185.
Crew: 180.
Gasoline: 177.
Oil: 30.
Weight loaded: 2,036.
Weight on front wheels (tail skid on ground): 1,714.
Weight on tail skid (tail skid on ground): 322.
Weight on front wheels (flying position): 1,826.
Weight on tail skid (flying position): 210.
Center of gravity (distance from wheels in flying position): 1 foot 5 inches.
Provision for special equipment not carried during test.

DESCRIPTION OF POWER PLANT.
ENGINE.
Make: Wright.
Factory No.: 119908.
A. S. No.: 94888.
Type: Eight-cylinder "V"; 90°.
No. in plane: 1.
Location: Nose of fuselage.
Rated h. p.: 220.
Rated r. p. m.: 2,000.
Bore: 4.72 inches.
Stroke: 5.12 inches.
Compression ratio: 4.8 to 1.
Weight dry: 503.
Gas consumption: 0.472 pounds per h. p. hr.
Oil consumption: 0.02002 pounds per h. p. hr.
Weight of water in engine: ---.
Remarks: ---.

IGNITION.
Battery or magneto: Magneto.
Make: Magicienne.
Number: 2.
Advance, degrees: 26° and 27°.
Gap interrupter: 0.020.
Distributor: ---.
Plugs, make: A. C.
Type: Metal body porcelain insulator.
Gap: ---.
Remarks: ---.

CARBURETORS.
Make: Claudel.
Type: Barrel butterfly.
Number: 1.
Setting jet: ---.
Choke: ---.
Compensator: ---.
Gas drains: ---.
Air intake: ---.
Altitude control: ---.
Effect to altitude: ---.
Remarks: ---.
RADIATORS.

Make: French.
Type: Ribbon.
Number: 1.
Position: Nose of fuselage.
Frontal area: ---.
Depth: 3\frac{1}{2} inches.
Length: 2 feet 4\frac{1}{2} inches.
Width: 2 feet 2\frac{1}{2} inches.
Radiator surface: ---.
Temperature adjustment: Vane shutters.
Water gap, pounds: ---.
Flow, gallons per minute: ---.
Weight, pounds: ---.
Thermometers, make: ---.
Type: ---.
Water capacity of whole system: ---.
Data on this radiator not available.

DESCRIPTION OF POWER PLANT.

EXHAUST PIPES.

Description: Individual stacks on each cylinder merging into manifolds which extend to rear of cockpit.

LUBRICATION.

Capacity oil tank: 4.5 gallons.
Dimensions of oil tank: ---.
Oil used (brand): ---.
Oil pressure: ---.

OIL TEMPERATURE: ---.
Type pump: Eccentric vane.
Wet or dry sump: Dry sump.
If wet, capacity: ---.
Description lubrication system: ---.

FUEL SYSTEM.

Number of tanks: Two; 1 main; 1 gravity.
Location: Main, rear of engine in fuselage entire system.
Gravity, in upper wing, over engine: ---.
Capacity, pounds: 183 pounds.
Capacity, reserve, pounds: ---.
Material: ---.
Gauge: ---.
Description of fuel-supply system: Air-pressure system.

MOTOR CONTROL.

Description: Rod and lever.

PROPELLER.

Make: Engineering division.
Number of blades: 2.
Diameter: 8 feet 2\frac{1}{2} inches.
Pitch: 7.26 feet.
Tips: Terne plate and linen.
Clearance: ---.
Manufacturer's number: ---.
A. S. No.: ---.
Remarks: Made of walnut, left hand.
PERFORMANCE TEST OF SPAD-13 WITH 220 HP WRIGHT ENGINE

FIGURE 1.
PERFORMANCE TEST OF SPAD-13 WITH 220 HP WRIGHT ENGINE

Figure 2.
FIGURE 3.—Three-quarter front view.

FIGURE 4.—Side view.

FIGURE 5.—Three-quarter rear view.
AIR SERVICE INFORMATION CIRCULAR.

(AVIATION.)

CHANGES

No. 2.

Page 3, column 1, Air Service Information Circular, Volume III, No. 286, "Performance Test of Spad 13 Equipped with 220 H. P. Wright Engine," is changed, by direction of the Chief of Air Service, in accordance with a recommendation of the Engineering Division contained in a letter dated March 24, 1922, as follows:

Page 3, column 1, paragraph following table, should read as follows:

Endurance, full throttle at 10,000 feet (including climb), 2 hours. (C. A. S. I. C. No. 2, May 15, 1922.)

CERTIFICATE.—By direction of the Secretary of War, the matter contained herein is published as administrative information and is required for the proper transaction of the public business.

10296-22

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