

AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 22

AVIA PURSUIT AIRPLANE B.H.21

By J. Serryer

From "Les Ailes," May 28, 1925

FILE COPY

To be returned to
the files of the National
Advisory Committee
for Aeronautics
Washington, D. C.

Washington
November, 1926

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

AIRCRAFT CIRCULAR NO. 22.

AVIA PURSUIT AIRPLANE B.H. 21.*

By J. Serryer.

Since 1923, the engineers of the large Czecho-Slovakian aircraft factory "Avia" have been working out the design of a pursuit biplane to be equipped with a 500 HP. Hispano-Suiza engine. Three airplanes of the same category were made and tested, all three with success, before the definite adoption of the characteristics of the B.H.21. The latter therefore had the benefit of all the experiments, from both the aerodynamic and structural viewpoints.

The Avia pursuit plane B.H.21, was very carefully constructed and is capable of good performances. With a useful load of 310 kg (683.43 lb.), it can attain a speed of 250 km (155.3 mi.) per hour near the ground, and almost as much at high altitudes. It can climb to 5000 m (16,404 ft.) in 14 minutes, and to 7000 m (22,966 ft.) in 35 minutes. It has a ceiling of 8500 m (27,887 ft.). In horizontal flight, its speed can be reduced to 90 km (55.94 mi.) per hr. Its landing speed is 70 km (43.51 mi.) per hr. It can take off within a distance of about 60 m (196.85 ft.).

Its wings are slightly staggered and have a span of 8.9 m (29.2 ft.). The span of the lower wing is a little greater than that of the upper wing. This has the effect of increasing the

* From "Les Ailes," May 28, 1925.

efficacy of the ailerons which are attached to the lower wing. The staggering increases the visibility forward and upward. The upper wing is in one piece and is supported in the middle by a cabane of streamlined steel tubes. The lower wing is in two parts which are attached to the lower longerons of the fuselage.

The wings are braced on each side of the fuselage by N-shaped struts of streamlined steel tubing and two pairs of double cables. The brace wires which start from the upper wing are attached to the lower part of the fuselage, thus assuring a better distribution of the stresses.

The wing structure consists of two box-girder spars with wood ribs and plywood covering. The spars are very deep and are reinforced by wood filling at the points of attachment to the fuselage, to the cabane struts and to the N-struts. Beyond the struts the cross section of the wing spars is reduced in order to fit the rims at the wing tips. The leading edge is formed by a spar and the trailing edge by a piano wire. Several bars are arranged between the spars and parallel to them. Each rib consists of a plywood web partially open-worked and two double rims or flanges.

On the lower wing a bar runs parallel to the rear wing spar and serves for attaching the ailerons. The latter have a framework of steel tubing. They are covered with fabric and controlled by a system of tubular rods and levers. They are not balanced. The portion of the wings between the leading edge

and the rear spar is covered with plywood. The leading edge is also reinforced by false rib tips. The wings are then covered with fabric. The wings have no interior brace wires, since the plywood covering renders them sufficiently rigid.

The fuselage frame consists of four wood longerons connected by wood uprights and cross bars. The fuselage is entirely covered with plywood which enables the omission of brace wires.

In front the lower longerons are bent and, together with the upper longerons, form the supports of the engine bed, which is made entirely of wood with a liberal use of plywood.

The pilot's cockpit, just behind the cell, is large and comfortable. The seat is adjustable, with provision for a dorsal parachute.

The horizontal stabilizer is imbedded in the fuselage and held by two bolts. It has a wood frame covered with plywood. The elevator comprises two unbalanced sections with wood frames and fabric covering.

The rectangular fuselage terminates in a vertical ridge, in place of a fin. The vertical empennage is thus restricted to slightly balanced rudder, which has a steel-tubing framework covered with fabric.

The steering controls consist of double cables, inspectable throughout their entire length through inspection windows in the fuselage wall.

The biplane is equipped with a Hispano-Suiza engine capable

of producing 300 HP. at 1800 R.P.M. The engine is entirely enclosed by a cowling of sheet aluminum. Cooling is accomplished by a honeycomb radiator made by the Avia Company. This radiator is located under the fuselage, into which it can be raised.

The gasoline tank is located in the bottom of the fuselage and is protected against incendiary bullets by a rubber covering. The gravity tank is in the center of the upper wing above the cabane and is accessible from above. The gasoline is raised from the main tank to the gravity tank by means of an Avia pump (exhausseur). The tanks are extremely light, being made of aluminum sheets by a patented process of soldering.

120 kg (264.56 lb.) of gasoline and 20 kg (44.09 lb.) of oil are carried. This suffices for a normal flight of three hours, or of two hours with throttle wide open, which gives the airplane a radius of action of 600-650 km (373-404 mi.) per hr.

The landing gear is made of wood and metal. The vertical struts are of laminated wood with a slightly conical shape, provided at the bottom with metal fittings for the shock absorbers. An inclined steel tube connects each fitting with the fuselage. Lateral stability is assured by two steel tubes which form a V. The two semi-axles slide in openings in the vertical wood struts. The shock absorber is made of rubber.

The 700 × 100 mm (27.6 × 39.4 in.) wheels, made by Dhainaut, are covered with fabric on both sides. The wheel track is 1.5 m (4.92 ft.).

The tail skid, of a shape standardized by the Avia Company, consists of a plate spring suspended in overhang. It will last a long time and is easily replaced.

General Characteristics

Span,	8.9 m (29.2 ft.);
Length,	6.87 m (22.54 ft.);
Height,	2.74 m (9.00 ft.);
Chord,	1.35 m (4.43 ft.);
Wing area,	22.00 m ² (236.81 sq.ft.);
Stabilizer area,	1.59 m ² (17.11 sq.ft.);
Elevator area,	1.1 m ² (11.84 sq.ft.);
Rudder area,	1.0 m ² (10.76 sq.ft.);
Weight empty,	765.0 kg (1686.54 lb.);
Full load,	1075.0 kg (2369.97 lb.);
Useful load,	310.0 kg (683.43 lb.);
Wing loading,	48.86 kg/m ² (10.01 lb./sq.ft.);
Power loading,	3.55 kg/HP. (7.83 lb./HP.).

Performances

Maximum speed,	250 km (155.3 mi.)/hr.;
Minimum speed,	90 km (56.0 mi.)/hr.;
Landing speed,	70 km (43.5 mi.)/hr.;
Climb to 5000 m (16,404 ft.),	14 min.
Climb to 7000 m (22,966 ft.),	35 min.
Ceiling,	8500 m (27,887 ft.).

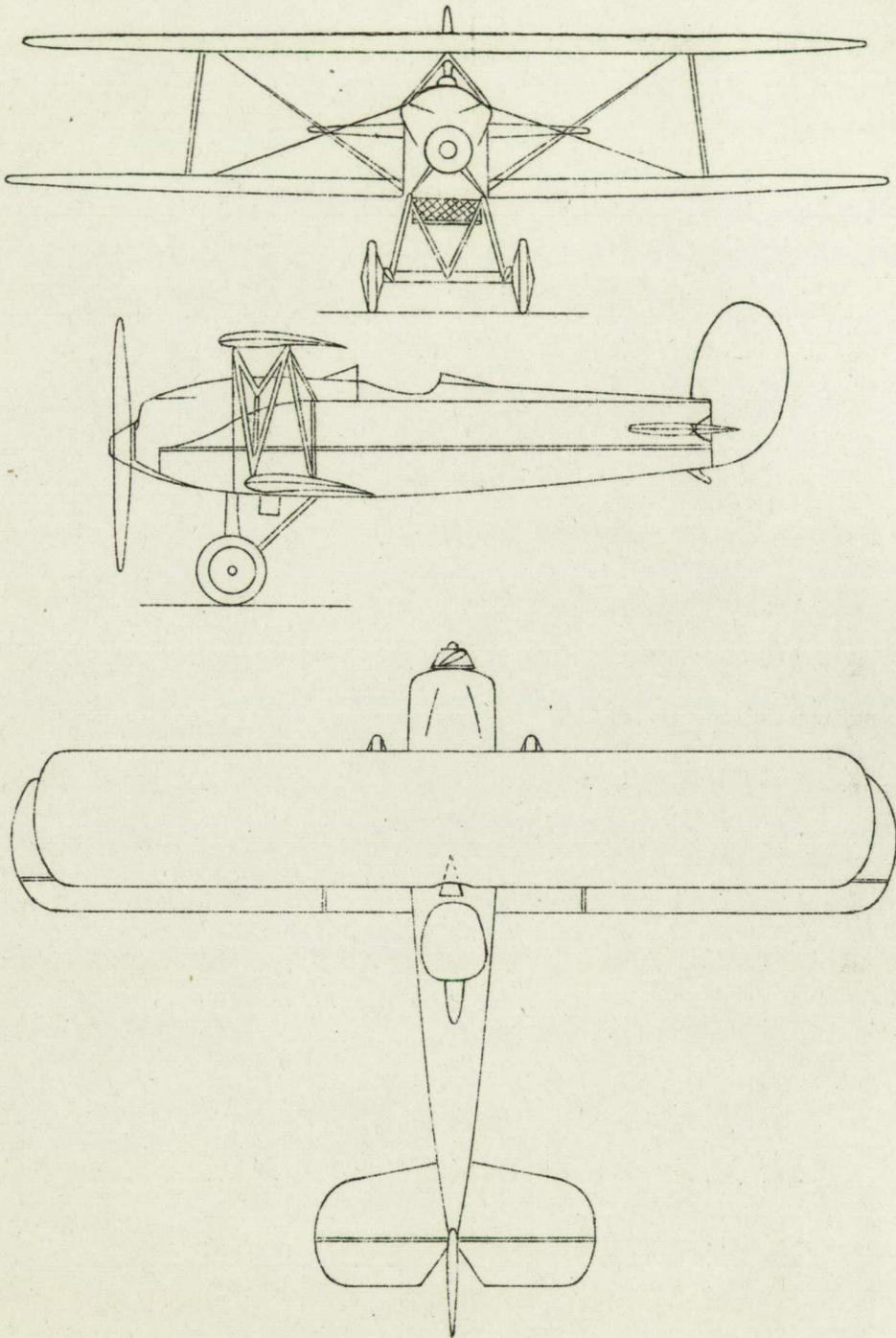


Fig.1 Avia pursuit airplane B.H.21



Figs. 2, 3 & 4 B.H.21 pursuit airplane, 300 HP. Hispano-Suiza engine