

AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 2

THE PANDER LIGHT BIPLANE
A School Two-Seater with 45 HP. Anzani Engine

From Flight, April 1, 1926

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THE PANDER LIGHT BIPLANE.*

A School Two-Seater with 45 HP. Anzani Engine.

After the success which attended the production of the light monoplane with 30 HP. Anzani engine, which was exhibited at the last Paris Aero Show, and of which several specimens have from time to time visited this country, it is not surprising that Mr. H. Pander of the Hague, should have turned his attention to a two-seater. When we visited the Pander Works last summer we had an opportunity of seeing the sketch design for the two-seater and also some of the parts which were then in course of manufacture at the Pander Works. The airplane, known as the type E, has now been finished and was tested recently by Lieutenant Elkerbout of the Dutch Navy. The airplane was found to be perfect as regards trim, and during a preliminary test flight the maneuverability was proved to be excellent.

The Pander type E, it will be seen from the accompanying illustrations (Figs. 1 and 2), is a biplane having a very small lower wing. In other words, it is of the type which has come to be described as a sesquiplane or one-and-a-half plane. An unusual feature of the airplane is the type of wing bracing

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employed. In order to keep the wing weight down, and also to facilitate storage and transport, it was decided not to make the top wing a pure cantilever, but as it was desired to keep the external members of the wing bracing structure down to a minimum, a rather unusual form of wing bracing, shown in the illustrations, was evolved. The top wing is built in halves, pin-jointed at the center to the cabane legs rising from the top longerons of the fuselage. Each wing half is supported by a pair of interplane V-struts, and the lift is taken by a single strut sloping outwards from the top longerons of the fuselage to the foot of the V-struts where these meet the lower wing. In normal straightforward flying, therefore, the V-struts are working in tension, and it is only at attitudes causing large movements of the center of pressure that any of these struts have to resist compression loads. It would appear likely that owing to the relatively flat angles, very considerable compression loads may be present in the single sloping lift struts, but doubtless these have been built of sufficiently heavy gauge steel tubes to carry the loads imposed upon them, and we are informed that the airplane has been designed with a factor of safety of $7\frac{1}{2}$, so as to be eligible for its aerobatics airworthiness certificate. For the rest the Pander type E shows very clean lines, and the view from both cockpits should be excellent, except in an upward direction, as the lower wing is of such small chord (2 ft, 9 in.) that it can

scarcely obstruct the view from the rear cockpit to any material extent.

Constructionally, the Pander type E is of composite type, wood being the material used exclusively in the wing construction and also in the rear portion of the fuselage, while the rest of the airplane, i.e., front portion of fuselage and the rudder and elevator, are of welded steel tube construction. The upper wing, which has a span of 32 ft. 10 in. and a maximum chord of 5 ft. 3 in., is built up on two main spars of box section, with spruce flanges and three-ply walls. The ribs are of three-ply, the top wing being further stiffened by having the whole leading edge, back to some distance aft of the front spar, covered with three-ply. The lower wing, which has a span of 16 ft. 5 in. has a single box spar, which measures 8 in. in width and just over 5 in. in depth. This box spar is built up of spruce and three-ply and the wing is further stiffened by a three-ply covering over the leading edge, forming yet another box spar. The covering of the wings is fabric, except over the center portion of the top wing, in which are housed the two petrol tanks (each with a capacity of $7\frac{1}{2}$ gallons), which is covered with three-ply. The interplane V-struts and the single lift struts are of streamlined steel tube and the rear strut of the V's has provision for adjustment of its length for the purpose of truing-up.

The fuselage, which is of oval cross section, is built in

halves, of which the front portion is of welded steel tube construction, the bracing being in the form of diagonal tubes as regards the forward panels, but having piano-wire bracing in the side panels in way of the pilot's cockpit. The rear portion of the fuselage is of similar construction to that of the Pander single-seater, i. e., light formers and stringers covered with plywood. The two fuselage portions are joined together at four points, where long fish-plates extend aft from the steel tube longerons to form a joint with the wooden longerons of the rear portion. These fish-plates may be seen in some of the photographs (Fig. 3).

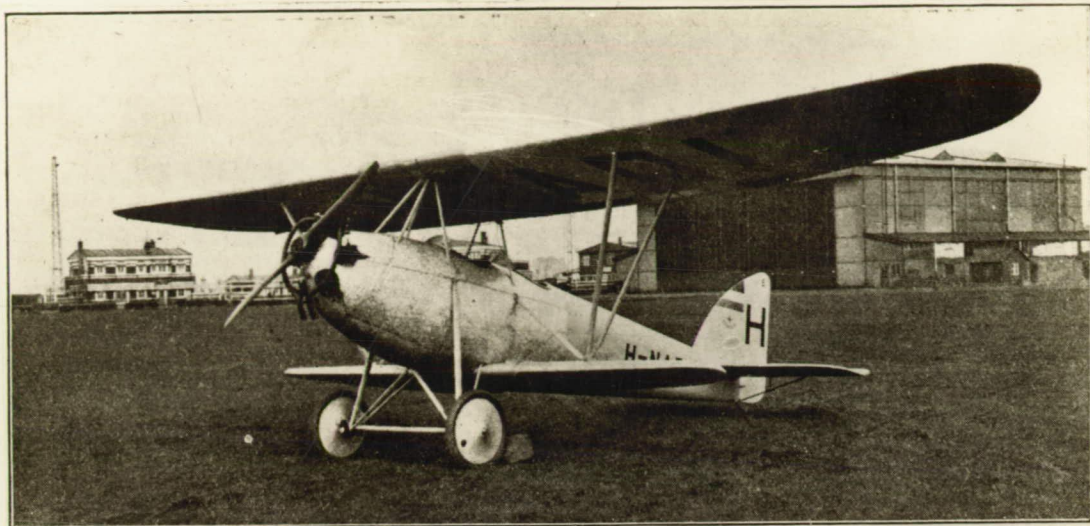
The airplane is equipped with dual controls, consisting of the usual joy-stick for elevator and ailerons, but having pedals in place of the more usual foot bar for the rudder, the pedals being more convenient in an airplane in which space, and particularly width, is restricted.

The 45 HP. 6-cylinder Anzani engine is attached at four points to the main structure of the fuselage, and a fireproof bulkhead is interposed between the engine and the front cockpit. The whole of the front portion of the fuselage is covered with sheet aluminum. As already mentioned, the fuel tanks are carried in the top wing, so that direct gravity feed can be employed, and the fuel system is such that the fuel can be taken from either tank or from both tanks simultaneously.

The landing gear is of streamlined steel tubes, with the axle working in a slot in the vertical strut, and anchored in such a way by rubber cord shock absorbers that not only can it travel up and down but is also free to move to a considerable extent laterally. The front landing gear strut runs to the top longeron of the fuselage, while the rear strut runs to the lower longeron, the V thus formed being braced laterally, not by cables or streamlined wires as is usually done, but by short steel tube struts, sloping to the center line of the bottom of the fuselage.

As in the Pander monoplane, the fin and stabilizer are entirely of wood construction, covered with plywood and built into the fuselage. The rudder and elevator have steel tube leading edges and welded sheet-steel ribs. In order to facilitate taxiing, the tail skid is mounted on and turns with the rudder, the method of mounting it in the rudder being shown in one of the photographs (Fig. 4).

Following is a brief specification of the Pander type E (Fig. 5): Weight empty, 702 lb.; total loaded weight (pilot passenger, and 4 hours' fuel), 1180 lb.; total wing area, 190 sq.ft.; wing loading, 6.2 lb./sq.ft.; engine, 45 HP. Anzani, developing normal power at 1500 R.P.M., and a maximum of 50 HP. at 1580 R.P.M.; power loading (on normal speed), 26.2 lb./HP.; maximum speed, 78 M.P.H.; cruising speed, 72 M.P.H.; landing speed, 38 M.P.H.; climb to 3000 ft. in 7 3/4 min. Ceiling, 11,500 ft.



Figs. 1 & 2
The Pander type E light airplane with a 45 HP.
Anzani engine. Note the unusual wing bracing.

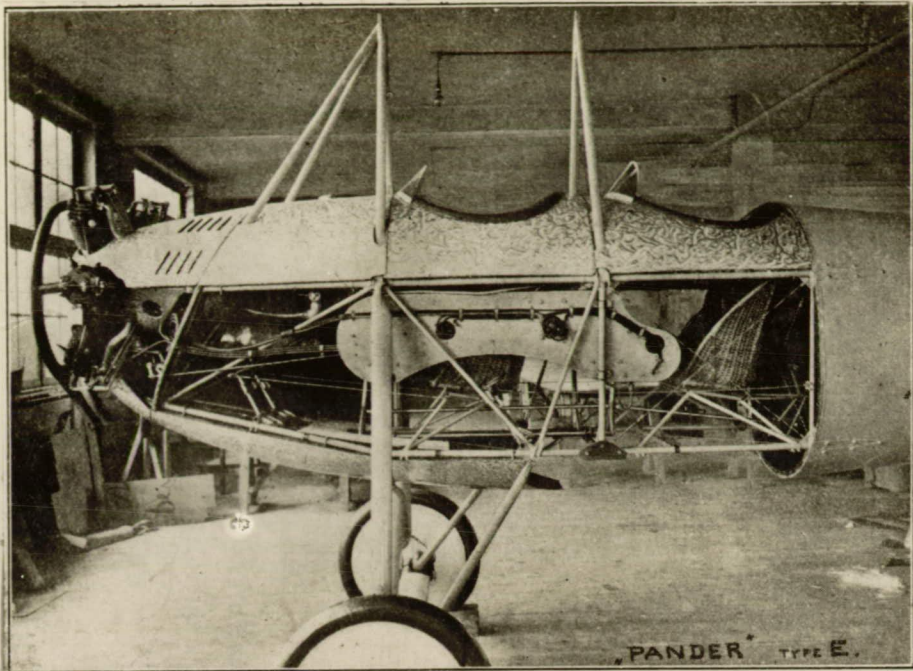


Fig.3 Front portion of the Pander light airplane, showing seating accommodation, etc. This portion of the fuselage is of welded steel tube construction. Note the attachment for the single spar of the lower wing.

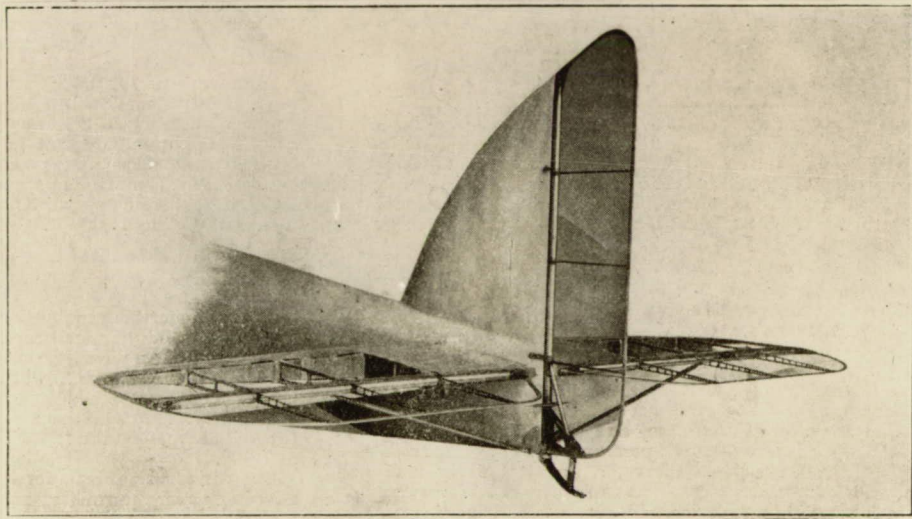
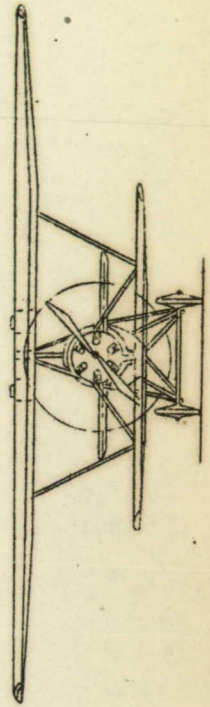
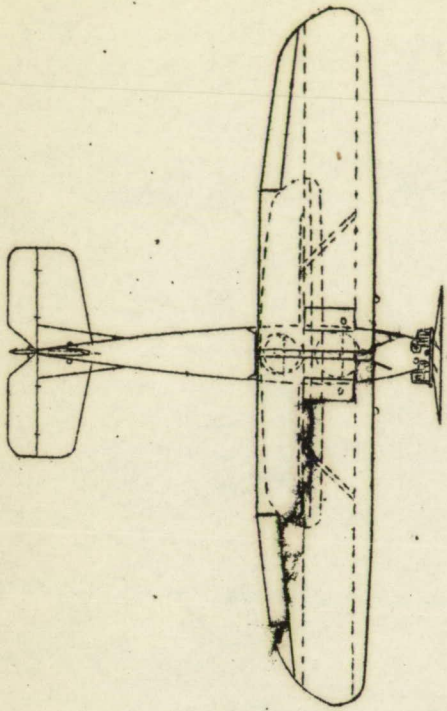
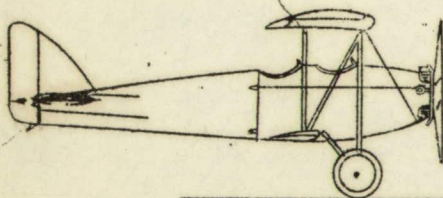


Fig.4 The tail of the Pander light airplane is partly of steel tubular construction. The tail skid is mounted on, and moves with the rudder



Span 32'10"
Length 20'4"
Wing areas:
Upper 154.0 sq.ft.
Lower 35.5 sq.ft.



45 HP.
"Anzani"
engine

Fig.5 Pander type E light airplane.