

AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

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No. 92

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NIEUPORT-DELAGE 640 (FRENCH)  
Commercial High-Wing Monoplane

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Washington  
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NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

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NIEUPOORT-DELAGÉ 640 (FRENCH)\*

Commercial High-Wing Monoplane

The airplane Nieuport Delage 640 is a single-engine commercial high-wing monoplane of all-wood construction, including the coverings of the wing, fuselage and tail. The elliptical shape and large aspect ratio of the cantilever wing give it excellent aerodynamic efficiency (Figs. 1, 7 and 8). The engine is mounted in the front end of the fuselage on a sheet-metal support and is easily removable. The cantilever control surfaces are located at the rear end of the fuselage. The landing gear is of the hinged type in two parts.

F u s e l a g e

1. Front end and engine-propeller group.-- This part was designed so as to enable a quick removal of the engine and afford perfect accessibility, and also to enable the installation of different engines by simply changing the engine support, the latter being attached at only four points to the front end of the fuselage.

2. Central portion.-- This portion is double-walled. It contains the pilot's seat, immediately behind which and under the wing is the passenger cabin, followed by the baggage room.

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\*Manufacturer's circular received from Paris Office, National Advisory Committee for Aeronautics, August 3, 1928.

3. Rear portion.— Behind the baggage room there is only a single wall clear to the rudder post. Here the stabilizer is embedded in the planking and the fin constitutes an integral part of the fuselage.

### W i n g

The wing is all wood, including its covering. It has spruce spars of variable width and thickness according to the distribution of the stresses (Figs. 2 and 3). Four of these spars are larger than the others and serve as attachment girders. All these spars are united by strong box ribs of variable section at intervals of about 60 cm (23.62 in.). The wing contour is formed by a leading edge and a trailing edge of spruce. The whole wing, including the ailerons, is suitably covered with birch plywood of variable thickness.

### Tail Surfaces

The horizontal surface is elliptical. Its structure is similar to that of the wing. The stabilizer has suitably shaped spruce spars which form its leading and trailing edges. It has slender transverse strips of spruce joined by poplar ribs, the whole being covered with plywood. The stabilizer is adjustable on the ground from  $-4^{\circ}$  to  $2^{\circ}$  (Fig. 5). The vertical surface consists of a parabolic fin and a rudder of essentially elliptical shape. Its structure is the same as that of the horizontal surface.

### Landing Gear

The landing gear comprises two independent triangular systems. Each one constitutes a V hinged to the fuselage under the axis of the airplane. The front struts are made of streamlined duralumin tubing. The two-part landing gear is made of Ny steel tubing suitably streamlined (Fig. 4). A shock absorber, on each side of the fuselage, consists of rubber washers always working under compression.

### Dual Controls

The dual controls can be thrown on or off at will by the chief pilot by means of a simple auxiliary device, thus permitting the use of this airplane for training purposes. The ailerons are operated by torsion tubes. The elevator and rudder are operated by means of tubes and cables. There are two pilot seats, the one for the chief pilot being on the left. These seats are adjustable and enable the use of seat parachutes. The fire extinguisher is within reach of the pilot.

### Passenger Cabin

This airplane has comfortable accommodations for four passengers. The inside dimensions of the cabin are 1.95 x 1.3 x 1.14 m (6.4 x 4.26 x 3.74 ft.). Access is through a door on the left (Fig. 6). The front seats are independent, the one on the left being removable to facilitate the entrance of passen-

gers. The rear seats are combined to form a single bench. The cabin is suitably lighted by large windows and is well ventilated. Exit is through the entrance door.

#### Baggage Compartment

A 1.1 m<sup>3</sup>(11.84 cu.ft.) baggage compartment is situated behind the passenger cabin. It is reached through a side door, which can serve likewise for introducing a wounded person on a stretcher, in case the airplane is used as an ambulance.

#### Tanks and Cooling System

The two fuel tanks are in the wing. They can be quickly emptied by the pilot. Their distance from the engine eliminates fire hazards. The tanks being situated over the center of gravity of the airplane, the consumption of the fuel does not affect the reactions of the controls. The oil tank is immediately behind the engine, thus reducing the length of the pipes. The engine is of the air-cooled type.

#### Pilot Room

The pilot room is immediately behind the engine, from which it is separated by a fire wall. It is protected by a windshield. It combines comfort and visibility and the possibility of rapid evacuation, either laterally or at the rear through a door leading into the passenger cabin.

### Speed and Range of Action

The maximum speed is 205 km/h (127.4 mi./hr.). The range of action at cruising speed (i.e., at about 2/3 of the engine power) is about 800 km (497 miles) at 175 km/h (109 mi./hr.). This range of action at the economical speed may be increased to 1100 km (684 mi.) at 130 km/h (80.8 mi./hr.).

### Other Uses

Aside from its utilization for carrying passengers, this airplane can be used as a training plane with disconnectable dual controls. It enables the carrying of four pupils and their successive turns at the controls at the will of the training pilot.

In time of war, this airplane can be used as an ambulance plane and can carry two wounded persons on stretchers.

### General Characteristics

Length	9.45 m	(31.00 ft.)
Span	15.40 "	(50.52 " )
Height	3.19 "	(10.47 " )
Effective lifting surface. including ailerons	30.00 m <sup>2</sup>	(322.92 sq.ft.)
Total wing area, including aileron	30.87 "	(332.28 " )
Stabilizer	2.72 "	(29.28 " )
Elevator	1.34 "	(14.42 " )

Horizontal tail surfaces	4.06 m <sup>2</sup>	(43.70 sq.ft.)
Fin	0.96 "	(10.33 " )
Rudder	0.87 "	( 9.36 " )
Vertical tail surfaces	1.83 "	(19.69 " )
Dead load		1050 kg (2314.9 lb.)
Fuel	200 kg	(440.9 " )
Equipment	40 "	( 88.2 " )
Disposable load	<u>460 "</u>	(1014.1 " )
Total disposable load	700 "	700 kg (1543.2 lb.)
Full load		1750 " (3858.1 " )
Power loading P/T <sub>0</sub>	7.6 kg	( 16.8 " )
Wing " P/S	58.3 "	(128.5 " )
Pilot	80 "	(176.4 " )
Pay load	<u>380 "</u>	(837.7 " )
Disposable load proper	460 "	(1014.1 " )

## Performances

Airplane equipped with 230 HP. Lorraine engine at 1800 R.P.M.

Theoretical ceiling	5500 m	(18044 ft.)
Maximum speed near ground	205 km/h	(127.4 mi./hr.)
Economical speed	132 "	( 82.0 " )
Minimum horizontal speed	113 "	( 70.2 " )
Landing speed with full load	84-92 "	(52.2-57.2" )

Climbing time to 1000 m (3281 ft.)	5 min. 30 sec.
" " " 2000 " (6562 " )	12 " 30 "
" " " 3000 " (9842 " )	21 " 30 "
" " " 4000 " (13123 " )	35 " 0 "

Drag Calculations and Static Tests

The glider was calculated for a full load of 1750 kg (3858 lb.) with the load factor 7.62 for the first flight case, 5.72 for the second, 2 for the third, and 6 for the case of hard landing.

Translation by Dwight M. Miner,  
National Advisory Committee  
for Aeronautics.



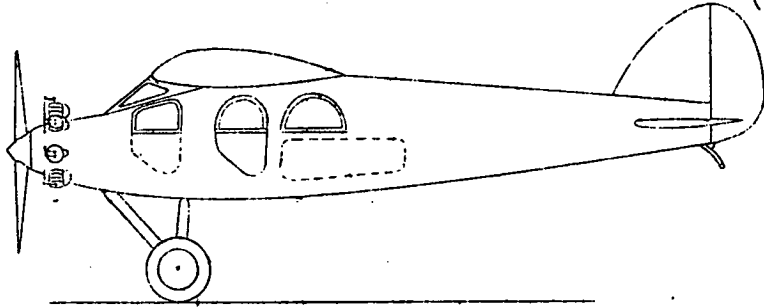
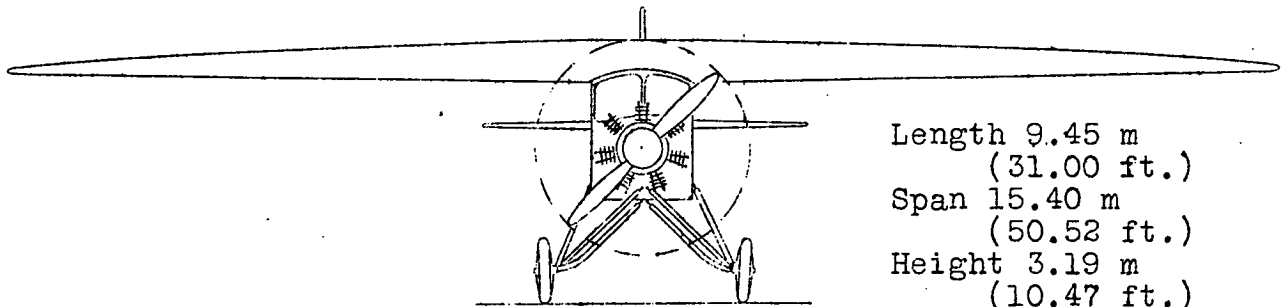
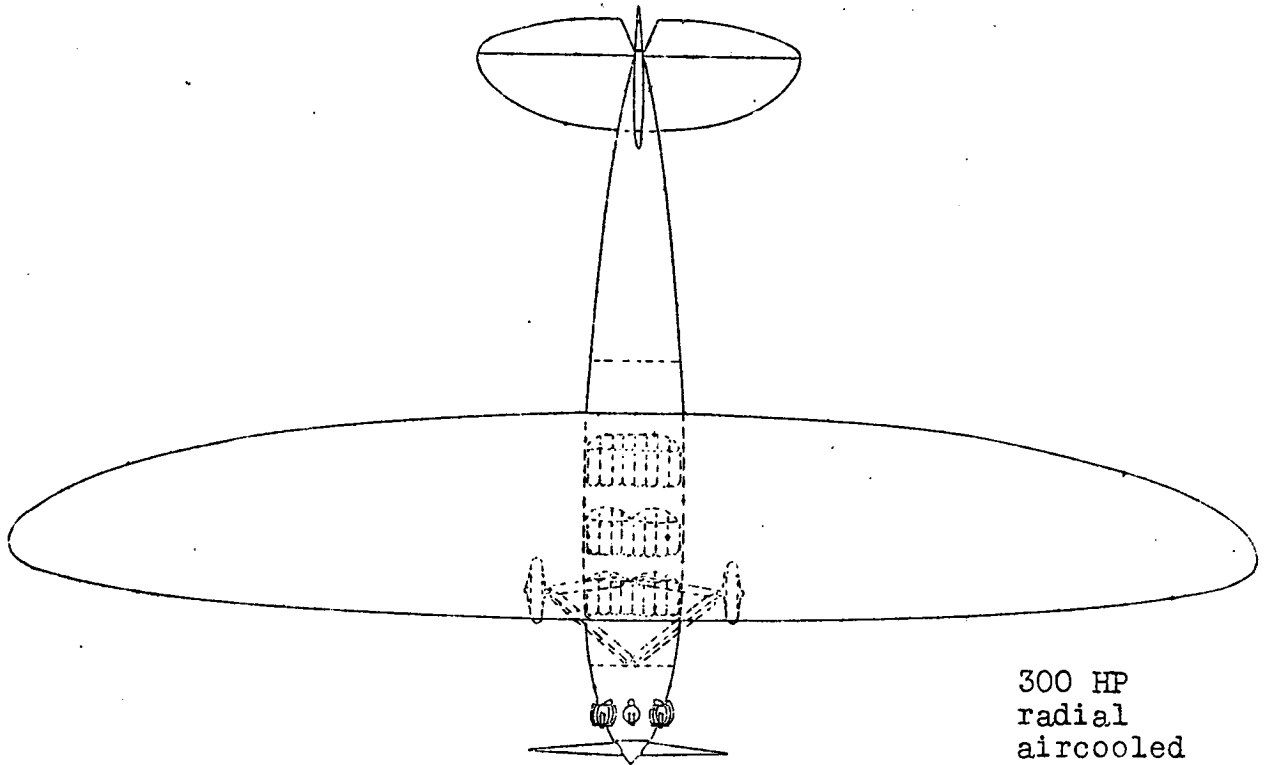


Fig.1 The Nieuport-Delage type 640 commercial airplane.

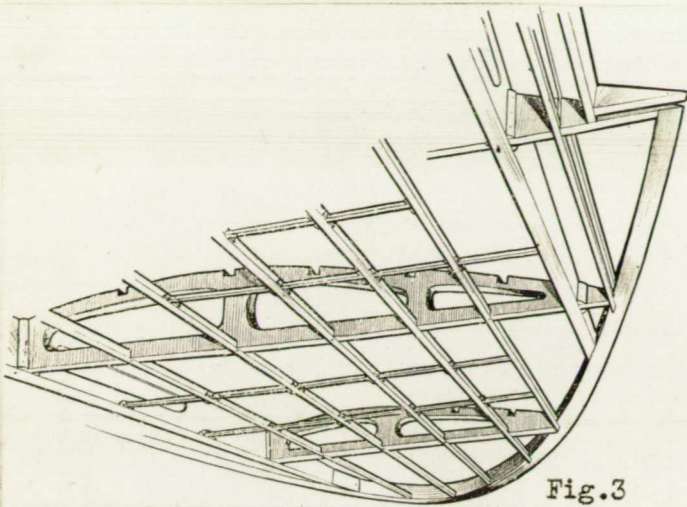


Fig.3

Fig.2 The wing structure.  
The rib has notches for the passage of the one piece spars braced laterally by glued bars, four of which are shown.

Fig.3 The tip of a wing before the application of the plywood covering.

Fig.4 Attachment of a landing-gear strut and the shock-absorber housing.

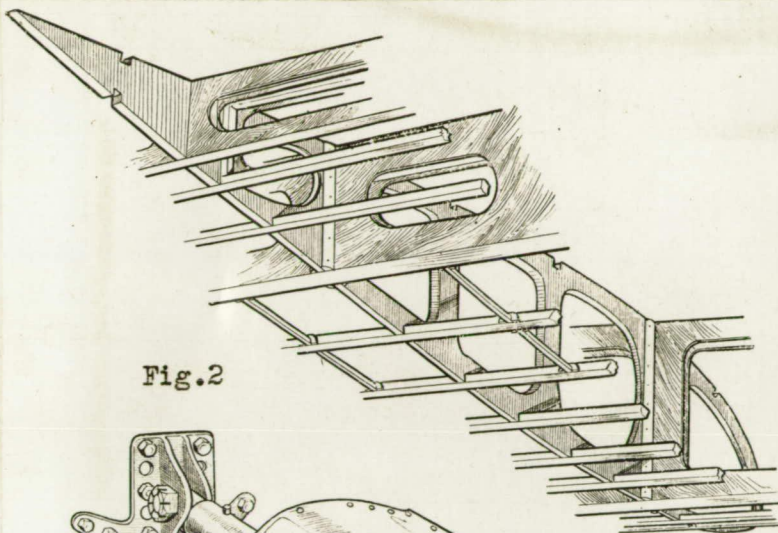


Fig.2

Fig.5 Device for adjusting the stabilizer on the ground.

Fig.6 Door for passengers and a window. Seen through the door: the tubular strut in the center of the cabin; at the back, a part of the horizontal door for the possible admission of an ambulance.

Nieuport - Delage 640 commercial airplane.

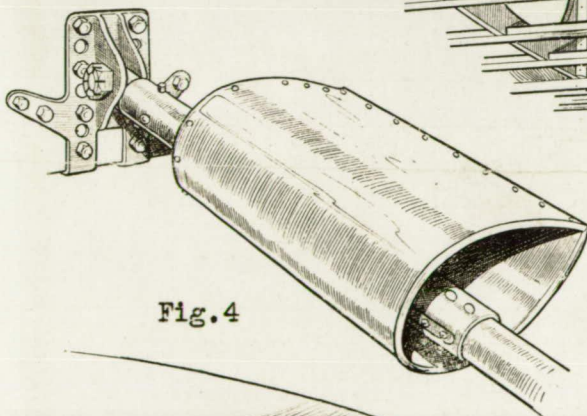


Fig.4

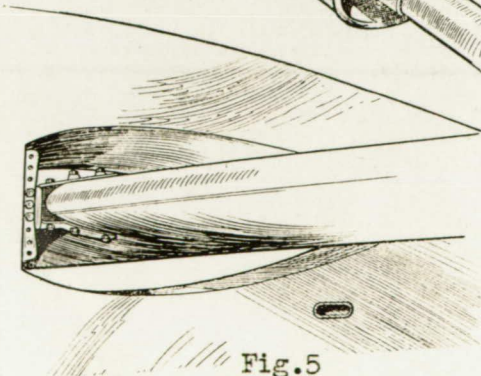


Fig.5

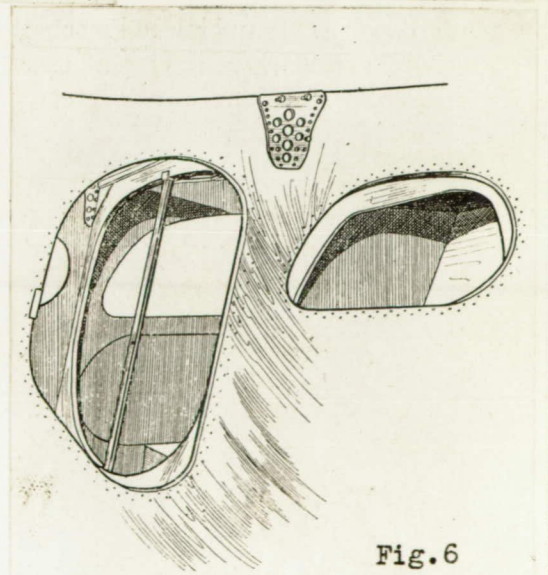


Fig.6



Paris Office, N.A.C.A. 1928



Paris Office, N.A.C.A. 1928

Figs. 7 & 8 Views of the Nieuport-Delage type 640 commercial airplane.