

NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS
MAILED
JUL 29 1927

TO *Mr. Truscatt*

AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 50

"LEVASSEUR 8" TRANSATLANTIC AIRPLANE

From "L'Aéronautique," June, 1927
and
"L'Aérophile," June, 1927

Washington
August, 1927

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS.

AIRCRAFT CIRCULAR NO. 50.

"LEVASSEUR 8" TRANSATLANTIC AIRPLANE.*

The "Levasseur 8" was derived directly from the three-seat naval airplane adopted by the French Navy. The wings and most of the elements of the fuselage were the same as in the standard three-seater. The sides of the fuselage were simply straightened, to enable the installation of three large fuel tanks between the engine and the cockpit. The walls of the fuselage were constructed like those of the three-seater, excepting that the plywood reinforcement, usually reserved for the portion below the water line, was extended the full height. The fire wall behind the engine was reinforced.

The wings, of wood and fabric, were like those of the standard observation airplane with some reinforcements on account of the extra load and a slight increase in area due to the elimination of the central cutaway and the folding device. The tail was not altered.

The landing gear, which was detachable through the action of a lever at the hand of the pilot, as usual in Levasseur naval airplanes, had been modified for taking off under full load. The Rudge wheels were mounted on ball bearings (R.B.F.) and roller bearings (S.K.F.) and equipped with large Dunlop tires

*"L'Oiseau blanc" used by Nungesser and Coli in their unsuccessful attempt to fly from Paris to New York. From "L'Aeronautique," June, 1927, and "L'Aerophile," June, 1927.

on hollow rims. The detachable landing gear weighed 123 kg (271 lb.), each wheel weighing 31 kg (68.3 lb.).

The fuel was contained in three duralumin tanks made by Vincent André, with a total capacity of 4025 liters (1063 gal.). They were 1.6 m (5.25 ft.) high and were provided with portions to prevent violent oscillations of their contents. The pipes had no joints except at their junction with the central collector. The pipes were copper covered with a vulcanized safety sheath.

The pilots' seats were of the side-by-side type, with the pilot on the left and the navigator on the right and a little to the rear. This arrangement had been very carefully planned, in order to provide the maximum comfort and the width of the fuselage required for the fuel tanks. The very comfortable seats were of the Pullman type. The controls were balanced, in order to avoid physical fatigue. The whole cockpit was protected by a windshield.

The engine was a 450 HP. Lorraine with reduction gear (17 : 11), giving a maximum of almost 550 HP. It had double "Scintilla" ignition; two Zenith carburetors, one single for one of the three rows of cylinders and the other double for the other two rows; air-intake "trumpets" in the bow of the fuselage; Ponsot spark plugs; Spirobloc gasoline gauges; Vincent André radiators; two A.M. fuel pumps and one hand fuel pump.

The two-bladed Levasseur propeller, of forged duralumin,

had a diameter of 3.8 m (12.47 ft.). This size, favoring efficiency, was rendered possible by the use of a reduction gear. As a result, however, the propeller clearance was hardly 0.2 m (.66 ft.), which rendered the take-off particularly difficult.

The navigation instruments comprised two Morel compasses, made by Krauss; a Badin-Aéra flight controller; a Le Prieur navigraph; taximeter with take-off indicator; Coutinho sextant; marine chronometer.

The safety outfit comprised rockets; Le Prieur adjustable sounders for alighting on water at night and a floating naval anchor.

The engine, a 450 HP. Lorraine, was subjected to special tests. The Lorraine Company, the Levasseur Company, and Nungesser agreed that an engine like the one to be used for the flight should be subjected to a long nonstop endurance test under the conditions which would obtain during the flight, i. e., without care or attendance, since, during the voyage, the pilot could only verify the good or poor functioning of the engine, by the control indicators before his eyes and since he could only regulate the speed and fuel consumption.

In order to serve as the criterion for this test, the Levasseur Company established the curve (Fig. 8) of the theoretical powers necessary for the flight of the airplane in terms of the time and the gradual decrease in weight. A testing bench was constructed and, after authorization by the minister

of war, the tests were made at the military field of Chartres, without interruption, for 43 hours.

In order to increase the margin of safety, the powers indicated by the Levasseur document were increased 10% and the resulting curve was followed without accident during the test.

The fuel consumption was 3863 liters (1020.5 gal.) for 42 hours. For the same period the oil consumption was 54.56 liters (14.4 gal.). The specific fuel consumption per HP/h varied between 233 and 220 g, the mean being 224 g (0.494 lb.).

At the end of 42 hours, and without stopping the engine, a one-hour test at full load was made. It was found that the engine had lost none of its original power.

The airplane made its first flights with a similar engine, then the engine to be used for the voyage served for about six hours without giving any difficulty.

The airplane thus underwent systematic tests with successive loads showing a cruising speed of 170 km (105.6 mi.) per hour under load, a speed which the releasing of the landing gear increased to 185 km (115 miles) per hour.

The take-off for the voyage took 46 seconds and a run of about 900 m (2953 ft.).

The outline and general arrangement of the "Levasseur's" transatlantic airplane is given in Fig. 1. The location of fuselage equipment is shown in Fig. 2: No. 1, the engine; 2, oil tank; 3, fire wall; 4, fuel tank; 5, partition; 6, cockpit.

In Fig. 3 the fuselage is shown in process of construction, the fuel tanks not yet installed. The nose of the airplane is shown in Fig. 4. One of the two symmetrical air inlets will be seen in front. The André radiator, with shutter is shown at base of wing. The landing-gear release is at the center of its bracing. The instrument board is shown in Fig. 5. The Moré compass faces the pilot with the flight controller in the middle and a portion of Le Prieur navigraph. A diagram of the Le Prieur safety sounder is given in Fig. 6. This consists of a 12 m (39.4 ft.) steel wire with a weight which actuates an indicator when it touches land or water. The indicator appears in the middle of the instrument board. The reel for letting out the cable will be seen at the right. The 450 HP. Lorraine engine with reduction gear is shown in Fig. 7. The 12 cylinders in W have a total capacity of 2442 liters (1490.2 cu.in.); each cylinder measures 120 × 180 mm (4.72 × 7.09 in.). The normal HP., 450, is at 1900 R.P.M.; with propeller, R.P.M. 1230; making reduction ratio 1 : 1.545. The planetary reduction gear is used. Fuel consumption at 1900 R.P.M. is 215 g (.474 lb.) per HP/h; at 1400 R.P.M., 266 g (.586 lb.) per HP/h. Oil consumption is 6 to 8 g (.013-.018 lb.) per HP/h.

The weight with propeller hub, without water or oil is 415 kg (915 lb.). The crank shaft has 4 bearings and 6 cranks staggered at 180°. The connecting rods are of type with eye. The pressure lubrication is by pump with triple barrel. Cooling

is by centrifugal pump. Odier starter.

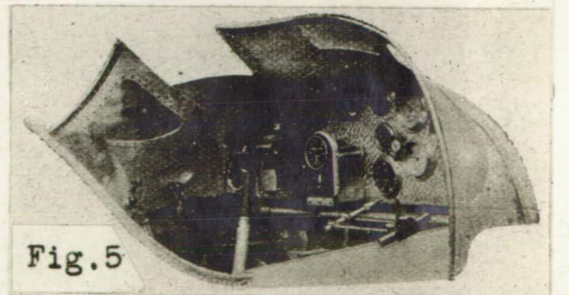
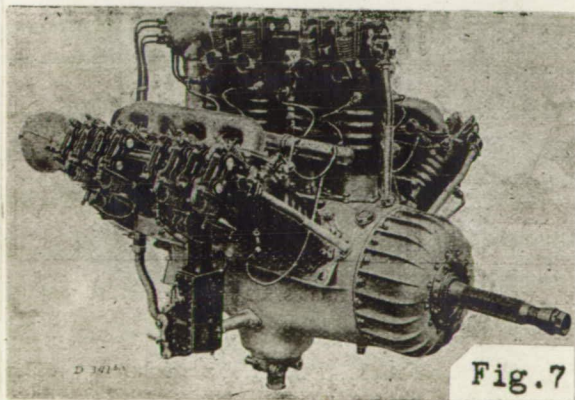
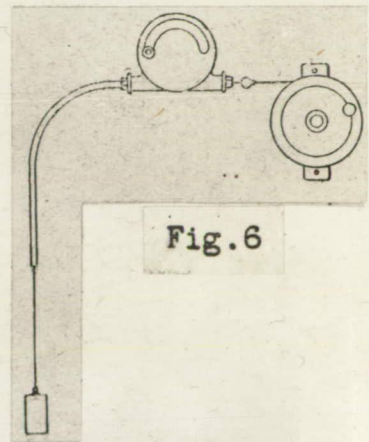
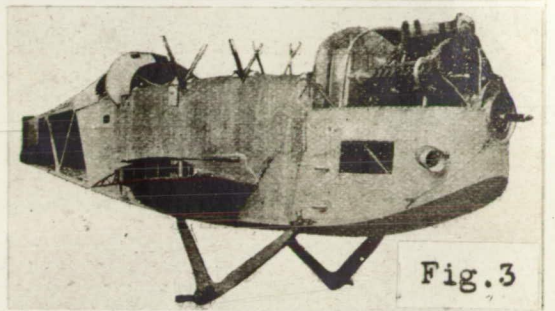
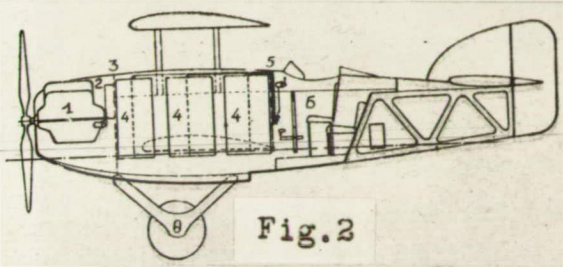
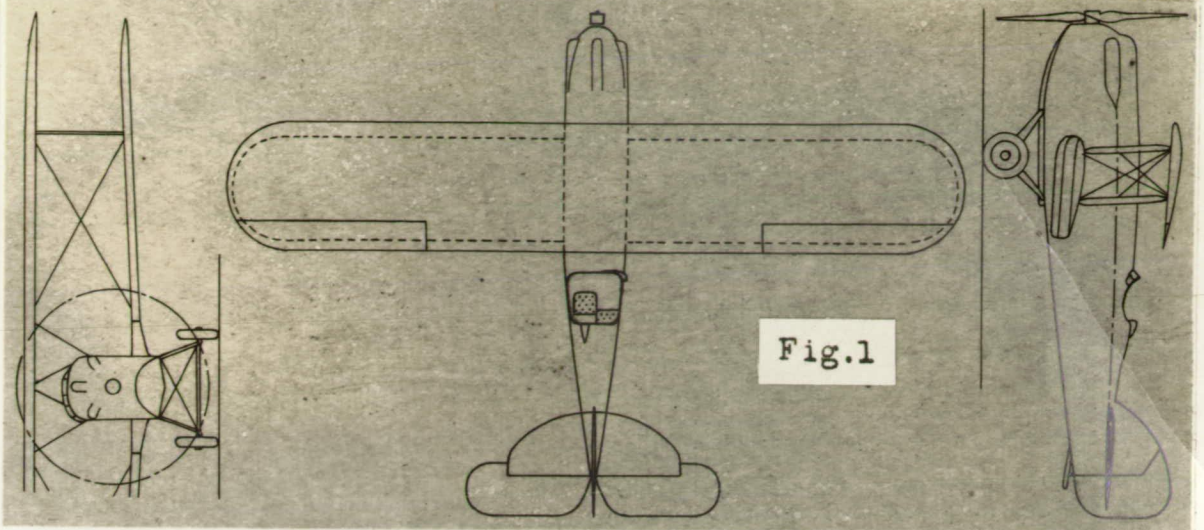
The standard three-seat naval observation airplane from which the transatlantic airplane was developed is an intermediary type between seaplanes and landplanes, of which latter it possesses all the aerodynamical qualities demanded by its service, but the airplane can, in addition, alight on water. At its lower part the fuselage is hull-shaped with one redan. On alighting on the water, a special device enables the propeller to be placed crosswise. There are no flotation air-bags. The wing structure presents a very marked dihedral angle and the water line reaches the roots of the lower wings which are watertight. Both the structure and the tail planes are of wood; the upper wings are provided with long ailerons. The trellis girder of the hull-fuselage is made up of multiply wood glued together and crossed at its knots. During static tests the breaking point has been fixed at a coefficient of 12.2 with a load of 3080 kg (6790 lb.) on the tail skid. The engine supports are tubular steel connected to the fuselage by four stays.

A Comparison of the Characteristics of the
Levasseur Standard and Transatlantic.

	<u>Standard</u>	<u>Transatlantic</u>
Span	14.6 m (47.9 ft.)	14.6 m (47.9 ft.)
Length	9.7 m (31.8 ft.)	9.7 m (31.8 ft.)
Height	3.85 m (12.4 ft.)	3.85 m (12.4 ft.)
Wing area	59.0 m ² (635.1 sq.ft.)	60.5 m ² (651.2 sq.ft.)
Stabilizer	7.0 m ² (75.3 sq.ft.)	7.0 m ² (75.3 sq.ft.)
Fin	2.4 m ² (25.8 sq.ft.)	2.4 m ² (25.8 sq.ft.)
Weight empty	1500 kg (3307 lb.)	
Useful load	540 kg (1191 lb.)	
Weight of fuel	310 kg (683 lb.)	2880 kg (6349 lb.)
Total weight	2350 kg (5181 lb.)	5030 kg (11089 lb.)
Weight of landing gear		123 kg (271 lb.)
Power loading	5.2 kg/HP (11.3 lb./HP.)	10 kg/HP (21.7 lb./HP.)
Wing loading	40.0 kg/m ² (8.2 lb./sq.ft.)	83.0 kg/m ² (17.0 lb./sq.ft.)

	<u>Standard</u>	<u>Transatlantic</u>
Speed at ground level	180 km/h (111.8 M.P.H.)	170 km/h (105.6 M.P.H.)
Speed at 4000 m (13123 ft.) altitude	160 km/h (99.4 M.P.H.)	
Ceiling 5300 m (17388 ft.)		

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



Drawings, views and engine of the Levasseur transatlantic airplane
Taken from L'Aerophile, June 15, 1927.

- A Maximum power
- B Normal "
- C Utilization curve
- D Fuel consumption corresponding to the utilization curve

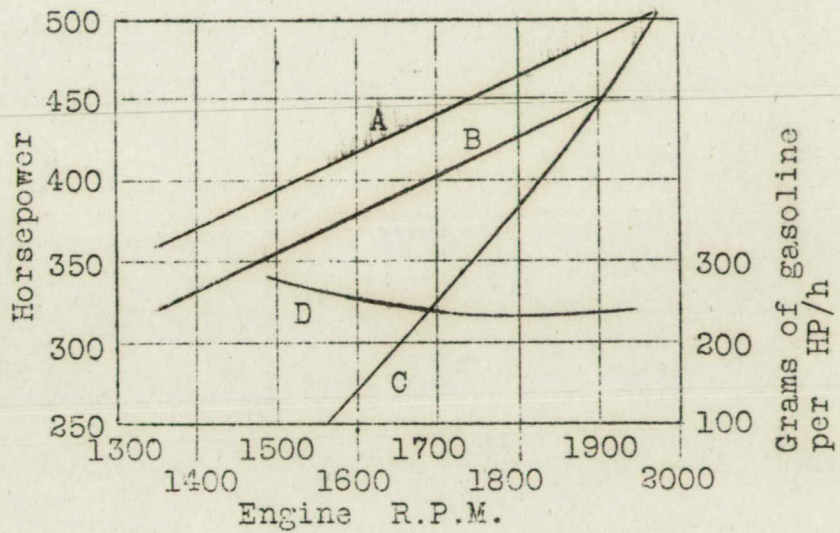
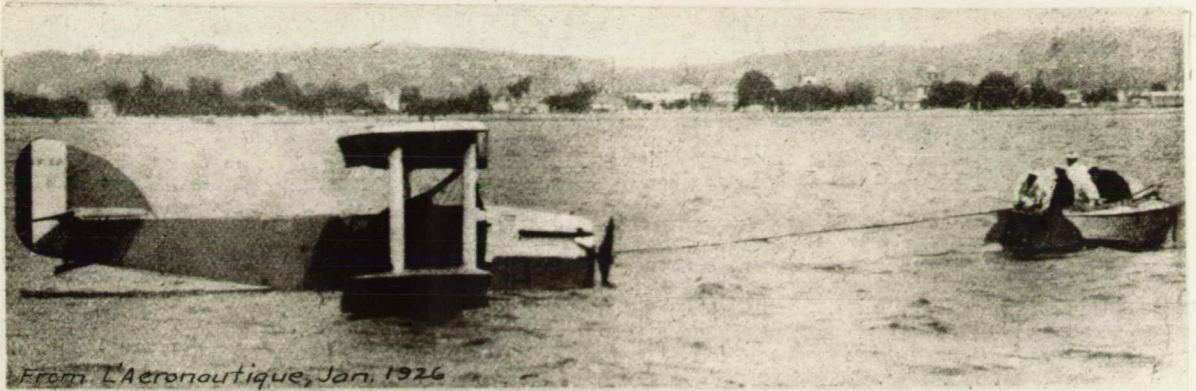
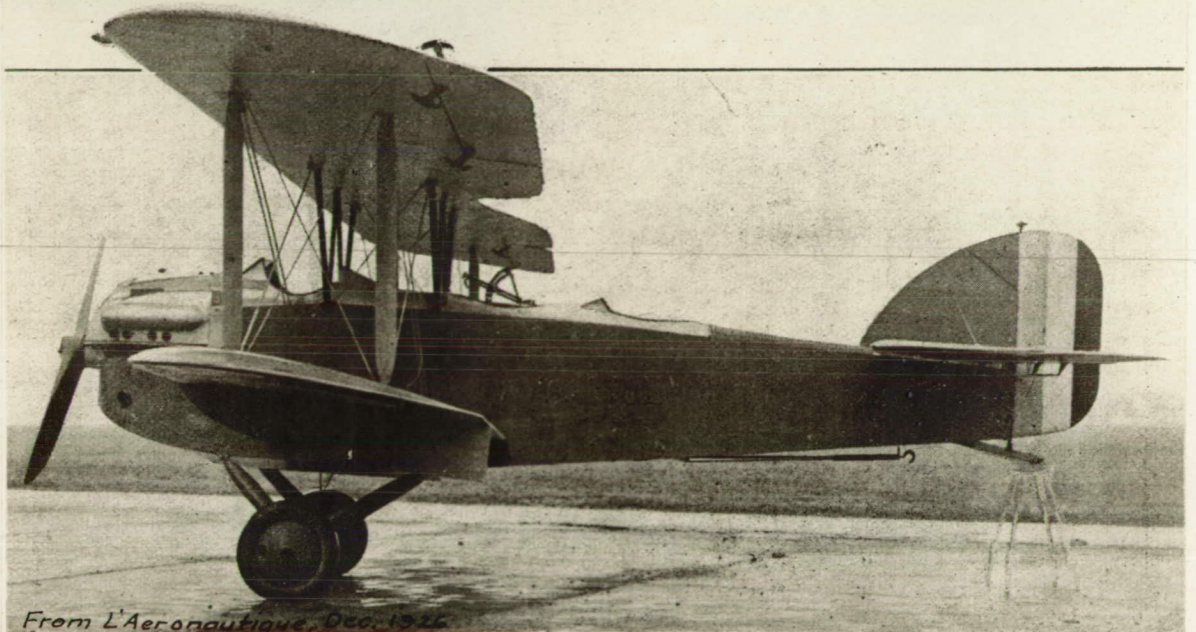


Fig.8 Power curves of the 450 HP Lorraine reduction-gear engine



From L'Aeronautique, Jan. 1926



From L'Aeronautique, Dec. 1926

The Standard Levasseur 4R3b airplane



Paris Office, N.A.C.A. 1927

The Levasseur transatlantic airplane
used by Captains Nungesser and Coli.