

5-

AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 165

THE FARMAN NIGHT BOMBERS 211 AND 212 (FRENCH)

Four-Engine High-Wing Monoplanes

Washington
July, 1932

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

AIRCRAFT CIRCULAR NO. 165

THE FARMAN NIGHT BOMBERS 211 AND 212 (FRENCH)*

Four-Engine High-Wing Monoplanes

The construction of large aircraft with great carrying capacity is on the new program for night bombers. The design, construction, tuning up and operation of these types involve a certain number of new and intricate problems, the solution of which greatly retards placing these bombers in service. In the meantime, need is felt for transitional types to be used until the above program is completed.

The transitional types had to be established for quick construction and adaptation, so as to take up their temporary duty as soon as possible. The performances and especially the speed of these types had to be materially improved to offer advantages over existing service types.

The general equipment and useful load of the airplane, built by the Farman Company to fulfill this double purpose, fully agree with those of existing types and are the outgrowth of reliable construction methods.

The monoplane wing is of the same family as that of the three-engine commercial types F.300, which have given excellent results in regular service. The F.300 resembles the famous four-engine Jabiru which, at the time, made sensational performances and had its safety considerably increased by the application of the multi-engine principle.

The first of the new types (211) (figs. 1, 2, 3) is equipped with four air-cooled Farman 230 hp engines. The second (212), which differs slightly from the former, will be equipped with Gnome-Rhone K 7 engines, greatly improving its performances at high altitudes where it is expected to exceed materially 200 km/h (124 mi./hr.).

*From L'Air, Vol. 14, No. 300, May 1, 1932.

WING STRUCTURE

The monoplane wing is of three parts: a central portion secured to the fuselage and two trapezoidal half-wings. (Fig 4.) The span has been increased from 23 m (75.46 ft.) in the F.211, to 25 m (82 ft.) in the F.212. The wing area of the latter type is further increased by maintaining the wing chord constant (5 m = 16.4 ft.) to near the ailerons. The wing structure has two box spars with spruce flanges and birch plywood webs with internal partitions at each rib, braced by strips. The ribs are of the wooden truss type. The distance between the two spars is maintained by box ribs.

In the 212, light-metal ribs are substituted for the wooden ribs at the point of assembly of the half-wing with the central portion. The upper and lower wing surfaces are braced, thus providing for inherent torsional strength. The wing is fabric-covered.

The engine bearers are mounted at the tips of a small lower wing (figs. 5 and 6), which is connected by vertical struts with the central portion and by oblique struts with the half-wings. These box struts are made of L.2.R alloy with front and rear fairings likewise of L.2.R alloy. In order to increase the safety, the wing carrying the engines is all-metal, including the covering. Finally, in the 212, the bay formed by the engine wing, the fuselage, and the central portion of the main wing is not strutted; as in the 211, but cross-braced by high-resistance-steel bands.

FUSELAGE

The fuselage is of the same construction as that of the F.63 and its derivatives, but its internal dimensions are greater, thus considerably increasing the comfort of the crew. The height is 2 m (6.56 ft.).

The fuselage has a wooden structure (fig. 7) and fabric covering. It is divided, from front to rear, into a gunner-navigator's cockpit with twin-gun mount and turret; an enclosed pilot's cockpit with dual controls. The chief pilot's seat is on the left and that of the assistant pilot on the right. In order to clear the passage from the rear to the front compartment, the seat of the assistant

pilot can be swung to the right and folded up against the wall of the fuselage. (Fig. 8.) Communication between the pilot's cockpit and the forward gunner's station is by an opening in the bulkhead separating these two compartments. This passage is usually obstructed by the right control stick which, however, can be raised and automatically disconnected, thus clearing the passage.

The radio compartment is behind the pilot's cabin. It has a sliding door in the right wall to permit parachute jumping. Directly behind is the bombing compartment with a large bomb gear on the left and a small one on the right. The latter may be replaced by an additional drop tank which permits increasing the range.

At the rear there is a large compartment for no specific purpose. It has, also on the right side, a door giving access to the fuselage. The machine gun for downward shooting is mounted on the floor of this compartment. In its after end is the rear gunner's station equipped with a twin-gun mount and turret.

On the whole, the general arrangement of the compartments is identical with that of the F.63 except for the dimensions and for certain details resulting from the location of bulkheads in the plane of the wing spars. (Fig. 9.)

TAIL SURFACES AND CONTROLS

The tail surfaces are of the standard fabric-covered type. The top of the stabilizer is braced by wires and the bottom by struts. The rudder is balanced. The elevator, rudder and aileron controls are of the flexible type (cable and piano wire). (Fig. 10.) The elevator is operated by a segment on which are mounted the two aileron wheel controls for the main and auxiliary pilot. The rudder is operated by bars.

LANDING GEAR

The landing gear has two independent faired wheels, each with a semi-axle hinged to the bottom longeron of the fuselage and carrying the wheel hub at its other end. A rear strut absorbs the recoil stresses. The semi-axle and

the recoil strut are enclosed in a fairing. Shocks are taken by a vertical oleopneumatic strut of the Messier type hinged under the forward vertical wing strut. (Fig. 11.) The wheels have brakes. The skid of the F.211 is replaced in the 212 by a swiveling tail wheel.

POWER PLANT

The four engines are mounted two-by-two in tandem, on each side of the fuselage, at the two ends of all-metal nacelles, carried by the small lower wing. These nacelles are attached to the wing at four points.

The engines of the Farman 211 are 9-cylinder radial air-cooled 230 hp Farman type 9 E.B., equipped with Saintin compressed-air starters.

The engines proposed for the Farman 212 are Gnome-Rhone 7 K.S.d., supercharged to 4,000 m (13,000 ft.). Their increased power permits materially improving the performances at high altitudes without modifying the other characteristics.

The capacity of the tanks has been increased to maintain the same range. One of the two protected drop tanks is located in each half-wing. Each tank has a capacity of 750 liters (198 gallons).

CHARACTERISTICS OF THE F.211

Span	23.00 m	75.46 ft.
Length	15.87 "	52.07 "
Height	4.22 "	13.84 "
Wing area	93.75 m ²	1,009.12 sq.ft.
Power	920 hp	
Weight empty	4,600 kg	10,141.25 lb.
Fuel	780 "	1,719.60 "

CHARACTERISTICS OF THE F.211 (cont'd)

General equipment	150 kg	330.69 lb.
Special "	1,050 "	2,314.85 "
Crew	320 "	705.48 "
Total useful load	2,300 "	5,070.63 "
Total weight	6,900 "	15,211.87 "
Wing loading	72 kg/m ²	14.8 lb./sq.ft.
Power "	7.5 kg/hp	16.5 lb./hp

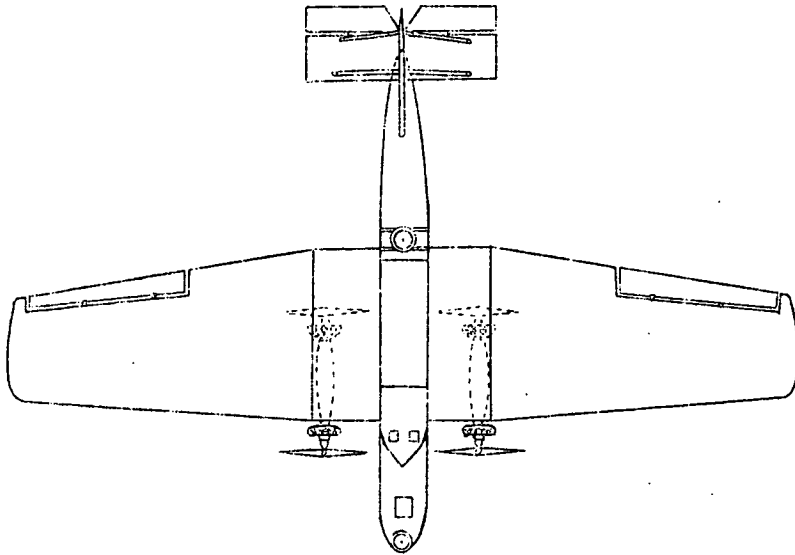
PERFORMANCES

	Type F.211 (with external bombs)	Type F.212 (estimated)
Speed at ground level	195 km/h (121 mi./hr.)	185 km/h (115 mi./hr.)
Speed at 3,280 ft.	194 km/h (120 mi./hr.)	196 km/h (122 mi./hr.)
Speed at 6,560 ft.	192 km/h (119 mi./hr.)	207 km/h (129 mi./hr.)
Speed at 9,840 ft.	180 km/h (112 mi./hr.)	215 km/h (134 mi./hr.)
Speed at 11,480 ft.	176 km/h (109 mi./hr.)	
Speed at 13,120 ft.		215 km/h (134 mi./hr.)
Speed at 16,400 ft.		210 km/h (130 mi./hr.)
Climb to 3,280 ft.	7 min.	6 min. 30 sec.
Climb to 6,560 ft.	16 "	13 "

PERFORMANCES (cont'd)

	Type F.211 (with external bombs)	Type F.212 (estimated)
Climb to 9,840 ft.	29 min.	19 min. 30 sec.
Climb to 13,120 ft.	45 "	26 "
Climb to 16,400 ft.		35 "
Theoretical ceiling	7,500 m	24,600 ft.

Translation by W. L. Koporindé,
National Advisory Committee
for Aeronautics.

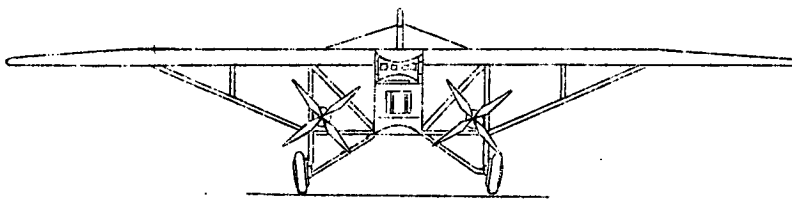


Span 23.00 m, 75.50 ft.

Height 4.22 m, 13.84 ft.

Length 15.87 m, 52.07 ft.

Wing area 93.75 m², 1009.12 sq.ft.



0 5 10 ft.
0 2 4 m

Four Farman 9.E.B. 230 hp
air-cooled engines.

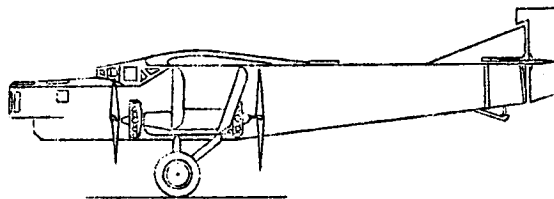


Fig. 1 General arrangement drawing of Farman 211 airplane.

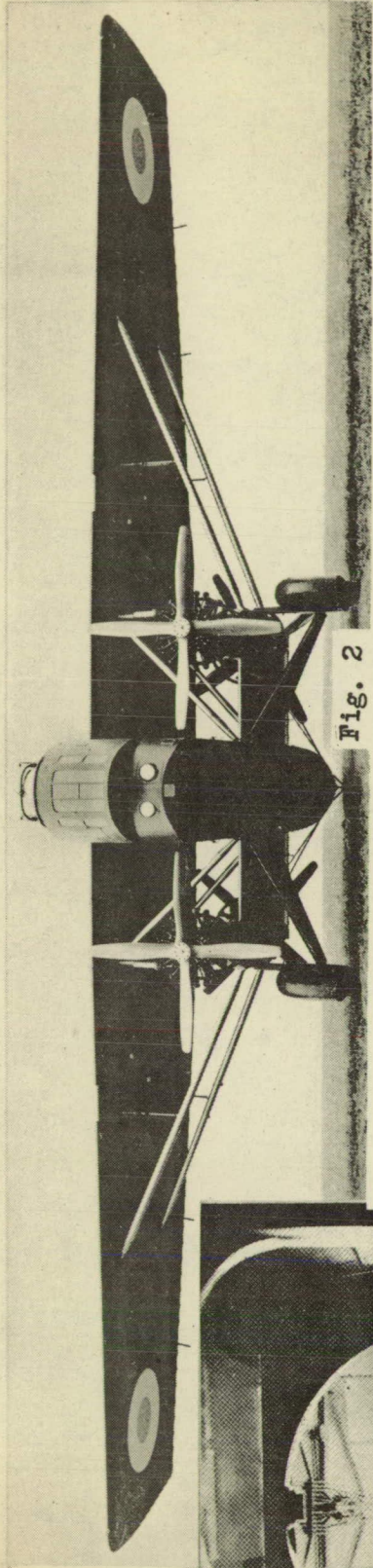


Fig. 2

Figs. 2,3 The Farman 211 night bomber airplane.

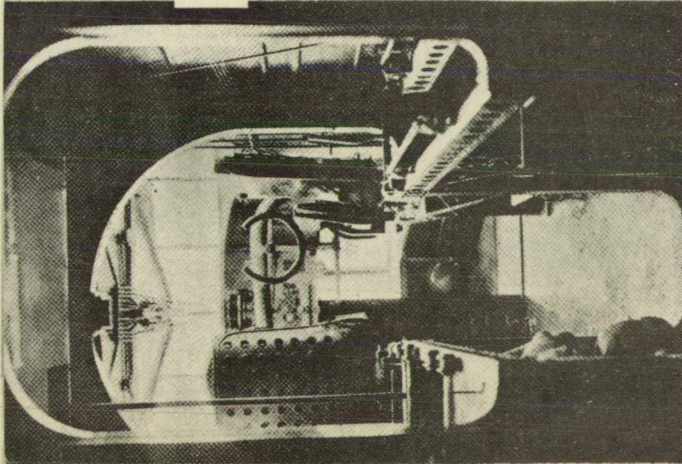


Fig. 8 Interior of fuselage of Farman 211, looking forward.

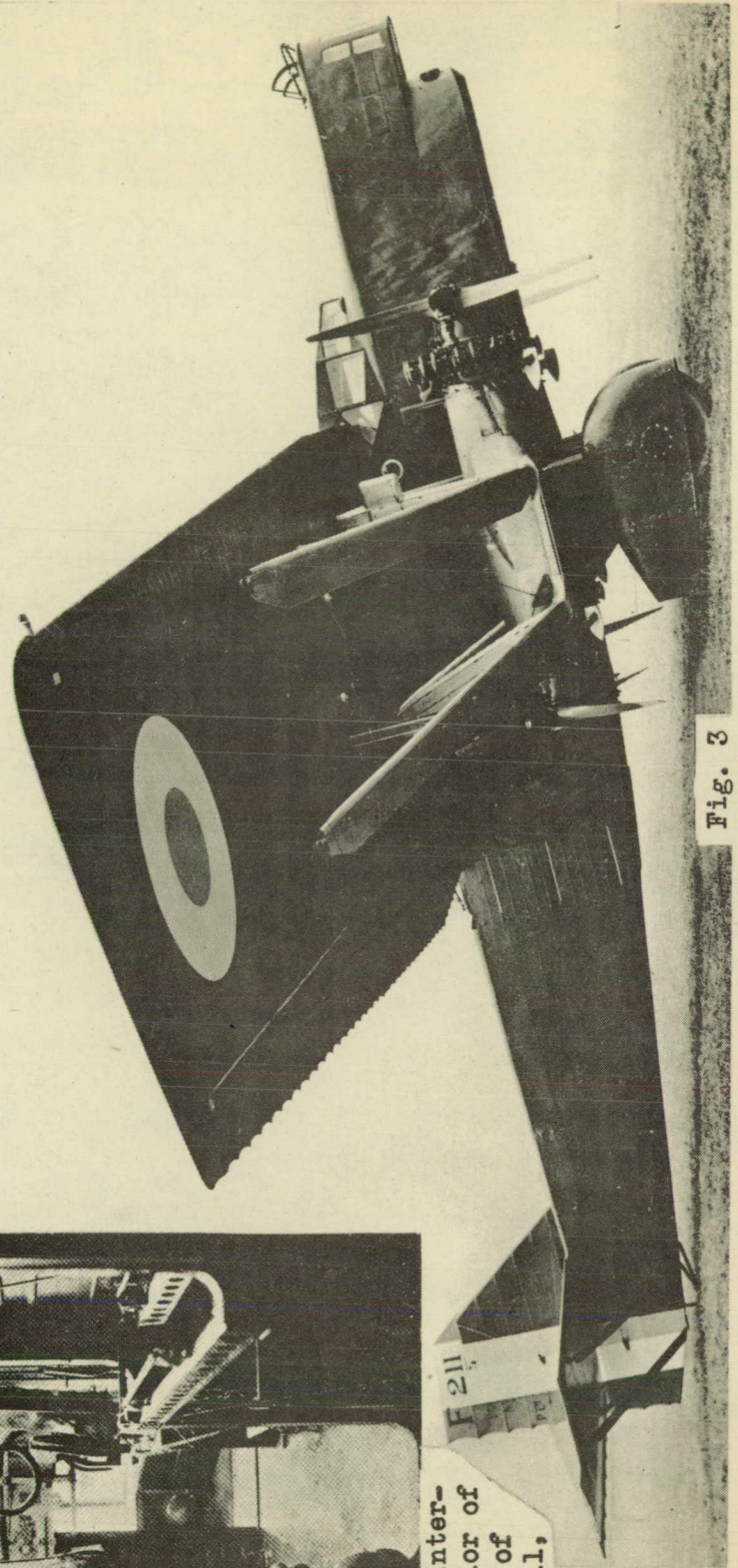


Fig. 3

Fig. 5 Engine nacelle of Farman 211

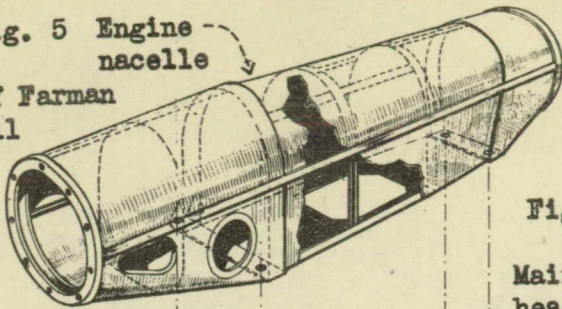


Fig. 9

Main bulkhead of fuselage and spar of central part of wing.

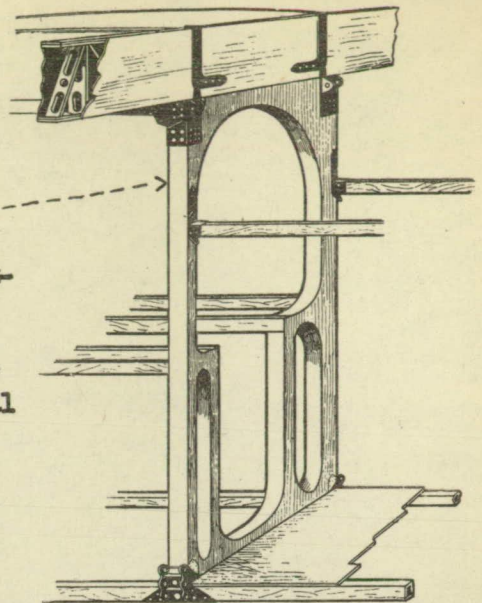


Fig. 6

Central connection between engine nacelles, (assemblage points indicated by four vertical lines).

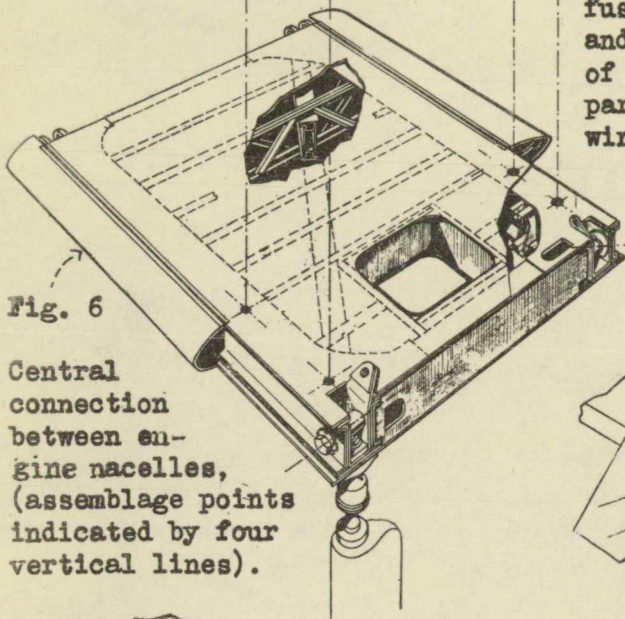


Fig. 10 Stabilizer and elevator.

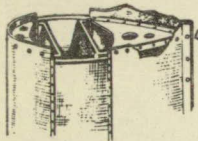
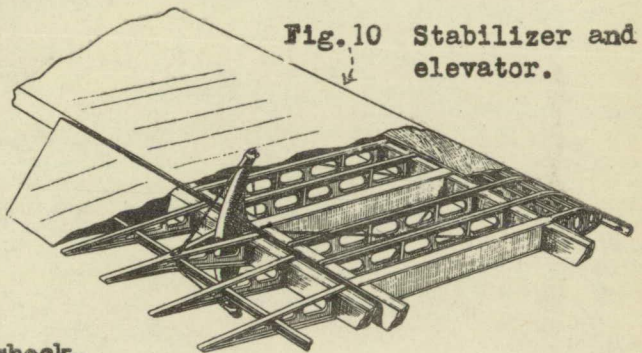


Fig. 11 Section of shock-absorber strut.

Fig. 4 Attachment of outer and central parts of wing.

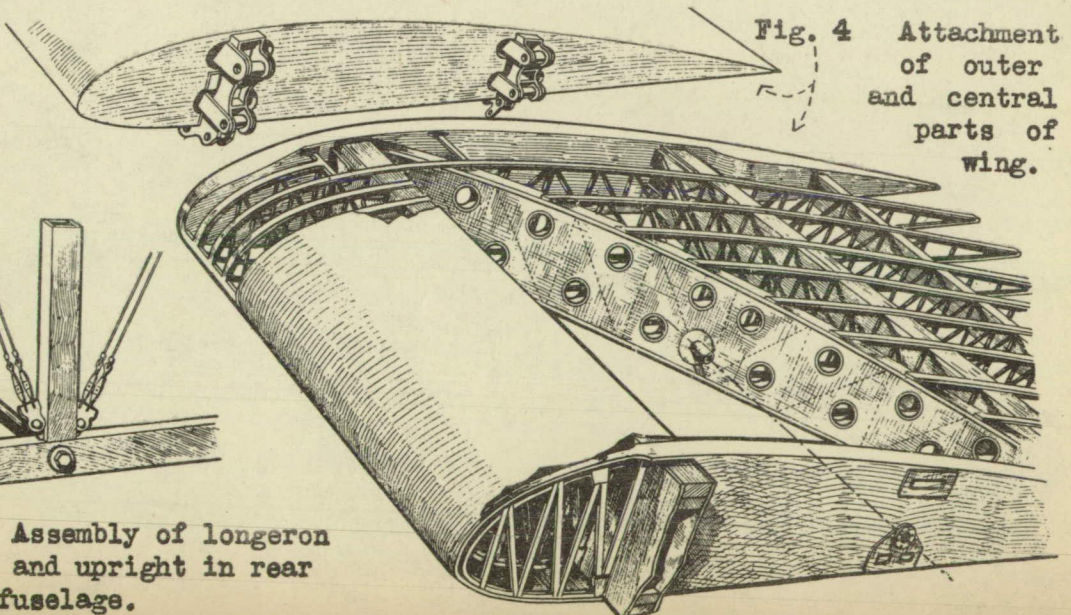


Fig. 7 Assembly of longeron and upright in rear part of fuselage.

