AIRCRAFT CIRCULARS

NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 122

THE "COMTE A.C. 3" MILITARY AIRPLANE (SWISS)

A High-Wing Semicantilever Monoplane

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THE "COMTE A.C. 3" MILITARY AIRPLANE (SWISS).*

A High-Wing Semicantilever Monoplane.

The "Comte A.C. 3" is a braced high-wing monoplane with two tandem 600 hp Hispano-Suiza engines mounted above the fuselage (Figs. 1, 2, 3, and 4). In the nose there is a station for a machine gunner. At the same level there are seats for two pilots abreast, this being the best location from the viewpoint of visibility. Back of the front wing spar, the fuselage can be fitted out for various purposes. For a distance of 4.5 m (14.76 ft.) the fuselage section measures 1.9 × 1.5 m (6.23 × 4.92 ft.). In the space between the wing spars the bottom of the fuselage has a trapdoor 1.9 × 1.4 m (6.23 × 4.59 ft.), which facilitates the loading of engines, stretchers, and other large objects. The bomb rack is also installed over the trapdoor at the center of gravity of the airplane. The bomber's station is situated under the wing. It is lighted by six cellon windows and can be entered through a large door on the left. This door is large enough to admit bombs of the largest size. At the rear end of the cabin there is a side-door entrance to the fuselage.

Communication between the front and rear machine-gun rooms during flight is enabled by a passageway under the pilots' seats.

*From Aero-Revue, April, 1930, pp. 98-100; and Les Ailes, May 15, 1930.

A 1000-liter (264-gallon) fuel tank is mounted in each wing near the fuselage. All the tanks are riveted sheet duralumin. The pipes are aluminum or copper, with flexible metal joints. The two main tanks are provided with quick-emptying devices. An auxiliary pump is installed in the cabin. Between the wings there is a 100-liter (26.4-gallon) fuel tank. Each engine drives two A.M. pumps which pump the fuel from the tanks to the carburetors.

The rectangular fuselage has a framework consisting of steel tubes autogenously welded with diagonal braces likewise of autogenously welded tubing. The front end is covered with sheet aluminum; the rest, with fabric. The cabin is lined with plywood up to the level of the windows.

The two pilots sit side-by-side, forward of and above the wing, on a flooring.

The steel-tubing engine nacelle is mounted on strong supports above the front wing spar. The engines are accessible during flight from the middle of the nacelle. Since the space in the nacelle is protected from the wind, the mechanic can work without danger while making necessary repairs. This greatly increases the reliability of the power plant. The central location of the engines, moreover, assures absolutely normal and comfortable flight for the pilots, even when only one engine is running. The water radiators, of the honeycomb type, are attached to the sides of the engine nacelle. The oil radiators

with fins, are attached under the engines on a level with the oil tanks.

The wing, seen in plan, has the contour of an irregular trapezoid with semicircular tips. Its profile, very thick at the fuselage end, is reduced only on the lower side from this point to the wing tips.

The wings are of normal wood construction with fabric covering. Both the box spars are braced by steel tubes and wires and form rigid supports for the ribs. The wings are hinged to the top of the fuselage and are supported on each side by a pair of steel tubing struts. These are attached to the wing at a short distance from the fuselage, thus leaving a long overhang. The landing gear is simple and strong. The shocks are absorbed by a pair of vertical spring struts with a maximum travel of 20 cm (7.87 in.). The 1500 x 300 mm (59 x 11.8 in.) Palmer wheels facilitate starting and landing on rough and soft ground.

The unbalanced ailerons are long and narrow and are operated by cables. They are hinged to auxiliary spars parallel to the trailing edge.

The horizontal empennage consists of an adjustable stabilizer and a two-part balanced elevator. The vertical empennage consists of a fin and a balanced rudder. The controls are operated by flexible cables running along the walls of the fuselage. The tail surfaces are of mixed construction, with steel spars, wooden ribs and fabric covering. The stabilizer is braced,

above and below, by wires attached to the top of the fin and the bottom of the fuselage.

All the wooden parts of the airplane are protected against heat and moisture by three coats of the best wood-filling paint.

The safety factor of the airplane meets the most exacting requirements for bombing planes.

The "A.C. 3" can carry loads of bombs up to 2000 kg (4410 lb.), or transport 15 soldiers fully equipped. It is therefore possible to transport to any exposed point, within a short time, a considerable detachment of troops and thus effect a concentration at a distant point, which may have very important results. This airplane can also be quickly fitted for carrying six wounded persons on couches or stretchers, thus rendering valuable service, as the hospitals in these countries are often 1000 km (620 miles) or more distant (Fig. 5). During the rainy season, when the roads are impassable for months at a time, this airplane can easily supply even the most distant stations with provisions, munitions, etc.

Aside from its purely military uses, the "A.C. 3" can be employed for scientific or economic purposes, such as the exploration of large unknown regions and the assistance of pioneers remote from civilization. All these uses require an airplane of absolute reliability, which is not subject to engine failure or forced landings. For military reasons (elimination of dead firing angles) and for reliability, the "A.C. 3" would seem to

offer the best solution of these difficulties.

The safety factors of the airplane, at 6000 kg (13230 lb.) flying weight, are 5.5 for case A at a large angle of attack, and 3.7 for case B at a small angle of attack. A speed of 280 km (174 miles) per hour is permissible, at which there is still a safety factor of 2. The breaking load of the horizontal tail surfaces is 200 kg/m² (40.96 lb./sq.ft.); of the vertical tail surfaces, 150 kg/m² (30.72 lb./sq.ft.). The safety factor is 4.5 for landing on the wheels and for a three-point landing.

Characteristics

Span	26	m	85.30	ft.
Length	18	"	59.05	"
Height	5.8	"	19.03	"
Wing area	94	m²	1011.8	sq.ft.
Wing loading at 6000 kg (13230 lb.) flying weight	63.8	kg/m²	13.07	lb./sq.ft.
Power loading	5.0	kg/hp	11.00	lb./hp
Empty weight without armament, radio and lighting system	3400.0	kg	7496.00	lb.
Total load	2600.0	kg	5732.00	lb.
2000 liters (528 gal.) gasoline for 10 hours	1460	kg	3219	lb.
150 liters (40 gal.) oil	140	"	309	"
100 " (26.4 gal.) benzol	83	"	183	"
2 pilots	160	"	353	"
Armament, load or persons	757	"	1669	"

Performances

The weight distribution can be varied as desired:

Maximum speed with two engines

	4500 kg (9920 lb.)	5000 kg (11025 lb.)	6000 kg (13230 lb.)
Full load			
Sea level	200 km/h (124 mi./hr.)	200 km/h (124 mi./hr.)	195 km/h (121 mi./hr.)
4000 meters	190 km/h (118 mi./hr.)	190 km/h (118 mi./hr.)	170 km/h (106 mi./hr.)

Maximum speed with one engine

	4500 kg (9920 lb.)	5000 kg (11025 lb.)	6000 kg (13230 lb.)
Full load			
Sea level	165 km/h (103 mi./hr.)	153 km/h (95 mi./hr.)	140 km/h (87 mi./hr.)
4000 meters	120 km/h (75 mi./hr.)		

Minimum speed with one engine

	4500 kg (9920 lb.)	5000 kg (11025 lb.)	6000 kg (13230 lb.)
Full load			
Sea level	70 km/h (44 mi./hr.)	75 km/h (47 mi./hr.)	83 km/h (52 mi./hr.)
4000 meters	90 km/h (56 mi./hr.)	95 km/h (59 mi./hr.)	105 km/h (65 mi./hr.)

Climbing times with 4500 kg (9900 lb.) full load

0 to 1000 m	(3280 ft.)	3 minutes
0 " 2000 "	(6560 ")	6 "
0 " 3000 "	(9840 ")	10 "
0 " 4000 "	(13120 ")	15 "
0 " 5000 "	(16400 ")	22 "
0 " 6000 "	(19680 ")	37 "
0 " 7000 "	(22960 ")	60 "

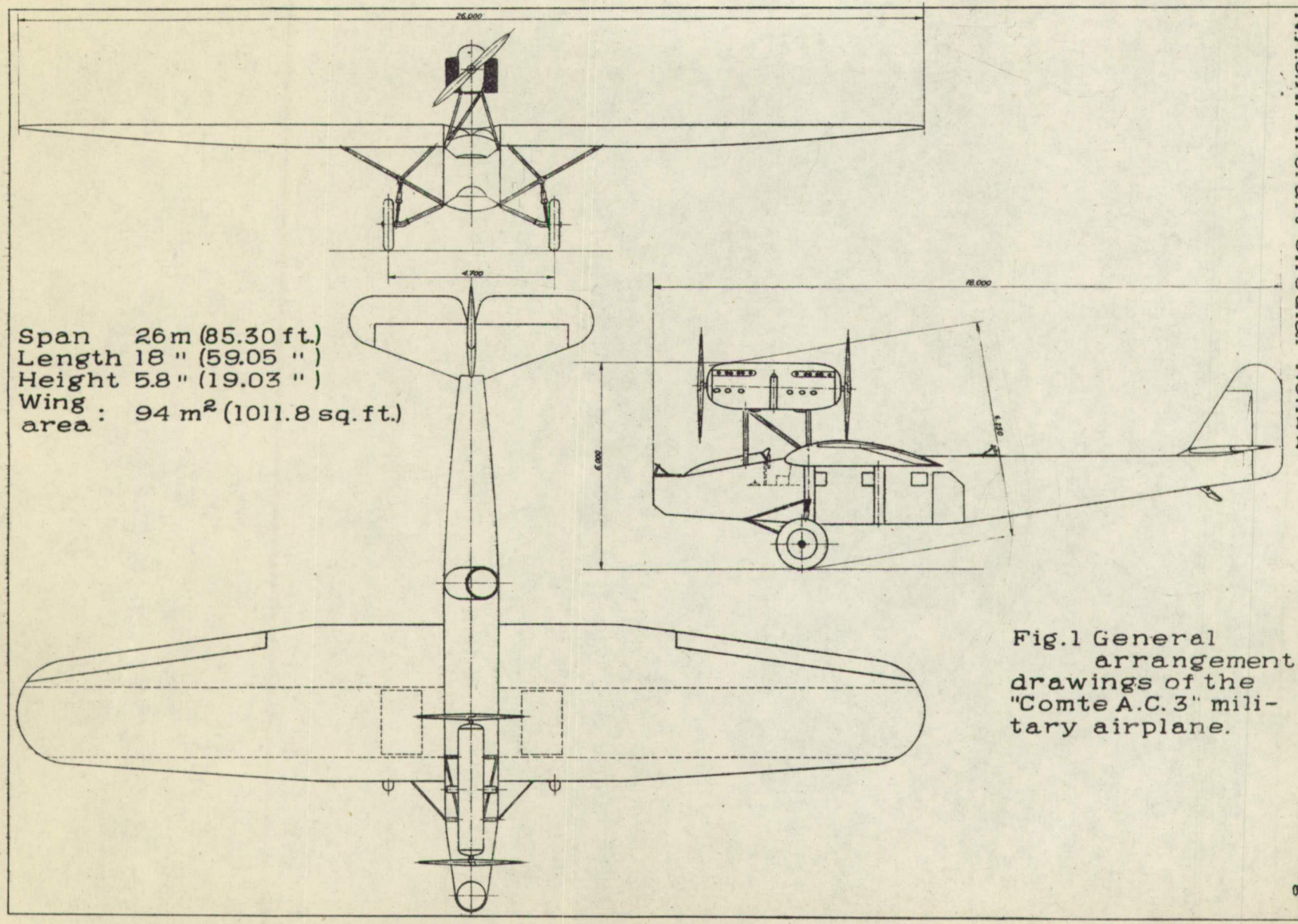
Ceiling with two engines

Full load	4500 kg (9920 lb.)	5000 kg (11025 lb.)	6000 kg (13230 lb.)
Ceiling	7300 m (23950 ft.)	6500 m (21325 ft.)	5200 m (17060 ft.)

Ceiling with one engine

Full load	4500 kg (9920 lb.)	5000 kg (11025 lb.)	6000 kg (13230 lb.)
Ceiling	4000 m (13123 ft.)	3300 m (10827 ft.)	1800 m (5905 ft.)

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



Span 26 m (85.30 ft.)
Length 18 " (59.05 ")
Height 5.8 " (19.03 ")
Wing area: 94 m² (1011.8 sq.ft.)

Fig.1 General arrangement drawings of the "Comte A.C.3" military airplane.

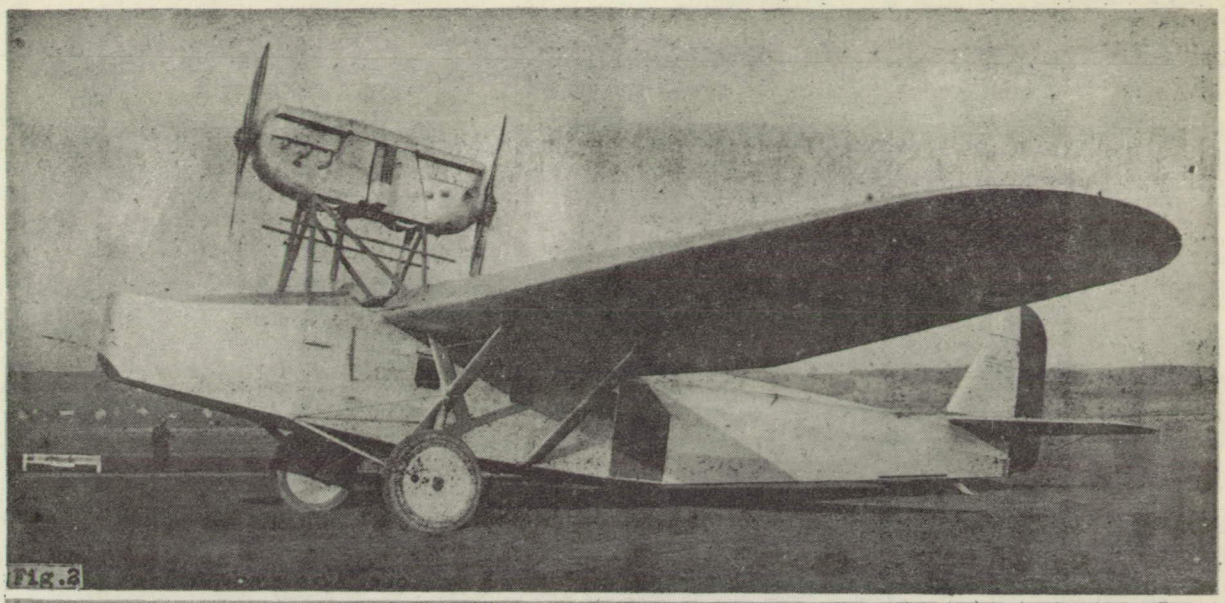


Fig.2


Fig.4

Fig.5

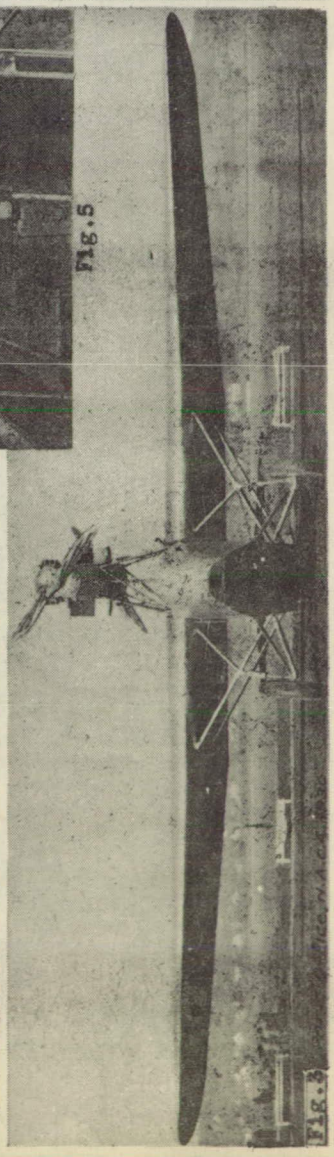


Fig.3

Views of the "Comte A.C.3" military airplane