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AIRCRAFT CIRCULARS
NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

No. 105

THE SAUNDERS "CUTTY SARK" COMMERCIAL SEAPLANE (BRITISH)
A High-Wing Monoplane Flying Boat

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THE SAUNDERS "CUTTY SARK" COMMERCIAL SEAPLANE (BRITISH)*

A High-Wing Monoplane Flying Boat.

The "Cutty Sark" is a four-seat commercial cabin seaplane, designed by S. E. Saunders, Ltd. It is primarily a flying boat; occasionally, however, landings at an airport may be desired. To cover this requirement, an amphibian gear can be supplied, the necessary fixing points being provided on the structure.

The power unit can be any engine or engines developing a total of approximately 200 hp. The installation consists of two Cirrus "Hermes" engines mounted as tractors in separate nacelles above the wing with ready accessibility while afloat. For real efficiency in running, efficiency which takes into consideration maintenance of engine, period of engine overhaul, renewal of wearing parts, life, fuel economy, and safety from forced landing, the engine must be run normally at a low ratio of normal power to maximum power available. It is with these conditions in view that the loading does not exceed 16.6 lb. per hp, with full load.

The engines are started from the cabin by means of a "Heywood" starting system which consists of a small compressor driven

*From a circular issued by S. E. Saunders, Ltd., England.

off one of the engines, a compressed air reservoir, gasoline vaporizers, and the necessary engine distributors and remote controls, etc. With this unit the engines can be started by the pilot while sitting in his seat.

The fuel system consists of main tanks, mounted in the wings, from which gasoline is pumped to gravity tanks behind the engines. The latter tanks carry sufficient fuel for half an hour's flight, and are fitted with gauges which indicate to the pilot when he has exhausted his main supply.

Gasoline cocks are fitted to the gravity tanks actuated by remote controls from the pilot. "Nivex" gasoline gauges are also fitted to these tanks. By keeping the piping and tanks remote from any source of fire, the risk of fire has been greatly lessened, the main tanks are remote from both hull and engine, and no gasoline pipes are allowed to enter the hull. The gravity tank is protected by a fireproof baffle. As a result of the fire prevention measures carried out in this seaplane, smoking is permitted in the cabin.

The lubrication system is contained wholly in the engine. A gauge on the side of the crank case shows the quantity of oil in the sump which has a capacity for two gallons.

The wings consist of a single full cantilever unit built and covered entirely in wood and three-ply. The system used has been adopted because of its suitability for the purpose for which the seaplane has been designed.

Incidentally, the construction of this wing makes for safety in case of accident on the water as it is water-tight and is capable of floating the whole seaplane, or in case of lateral stabilizer failure the wing tip performs the same function.

The stabilizer elevators and rudder are of welded steel construction, fabric-covered. The fin, however, is built up from the tail of the hull in duralumin and has a removable side provided for access to the controls.

The elevator and rudder have balanced surfaces: the former being actuated by a torque shaft through the fin, the latter by cables direct into the hull. Adjustment of stabilizer incidence is accomplished by a screw jack actuated by cables from a hand wheel near the pilot.

The hull is built of "Alclad" protected duralumin, a material which is resistant to corrosion. The form of planing bottom of the boat successfully developed on flying boats of various sizes, is of low resistance and, owing to the form of the bows, is very clean running (Fig. 4). It will be found that the size of the hull gives ample room for the seating accommodation. In the bows is a compartment for the stowage of warps, anchor and other marine gear. It is fitted with a hinged hatch.

The cabin with four-seat accommodations is completely enclosed. The front screen is fixed and is made of triplex glass. Side panels are made to slide so that for landing and maneuvering on the water the pilot can lean out and see vertically downwards or forwards.

The starboard sliding window is part of the main access to the cabin. Over the seat on that side a section of the roof is made to slide transversely, this combined with the side opening forming an easy entrance. The window frame is used as a step easily reached from a dinghy.

The whole of the front, sides, and roof are either glass or cellon, so that although an enclosed cabin, the pilot has an exceptional view. The sides of the cabin are upholstered as also are the comfortable seats. One of the seats with hinged back framework is shown in Figure 5. Space is provided between the seats as a passageway with the floor set lower than that under the seats. The headroom is 4 ft. 6 in., which is ample for moving about between the seats. The pilot is on the port side front seat with the dashboard in front of him. When dual control is fitted the other front seat is used.

This dual control is made as a detachable unit which is easily fixed when required. Stick control is used, with parallel motion rudder bar instantly adjustable for leg reach. The throttle control is fixed centrally on the dashboard within easy reach of either pilot.

A triangular roof panel over the dashboard is made to hinge backwards, giving sufficient space for the pilot to stand up through the opening. This is so arranged that he can stand in this position to pick up moorings. With the twin throttles and engine switches to his hand he can control the seaplane up to

the mooring buoy which he picks up by means of a "grabit" boat-hook.

For getting under way from the mooring a special bollard is placed by the pilot's window to which the end of the buoy rope is made fast after being passed between the bollards on the stem. It is only necessary for the pilot to slip this rope for the boat to be free.

Another device to assist maneuvering on the water is the flap drogue. This consists of two plates hinged on the sides of the hull near the step. These are spring-loaded and are actuated from the pilot's seat. They are used as brakes in order to reduce the taxiing speed on the water which tends to be too high with such a low resistance hull and with two engines running at a speed sufficient for air control. A certain amount of steering is also possible with these flaps (Fig. 6).

All flooring in the hull is made detachable as also are the side panels, so that the inside of the plating can be inspected or paint renewed.

It has been mentioned that the hull is built of "Alclad," which is resistant to corrosion; it is, in addition, protected by Ferric cellulose lacquer both inside and out. The wings and other parts are also covered with Ferric lacquer.

Water-tightness of the wings is essential in a flying boat, whether of metal or wooden construction. All holes in the surface are very carefully sealed, the only opening to the atmos-

phere being through the vent holes in the trailing edge, the lowest point in the wing. Where controls pass out of the hull or wing, sleeves or glands are used.

All steelwork is either stainless or cadmium-plated. All aluminum used in cowling is anodically treated and all rivets of duralumin are similarly treated.

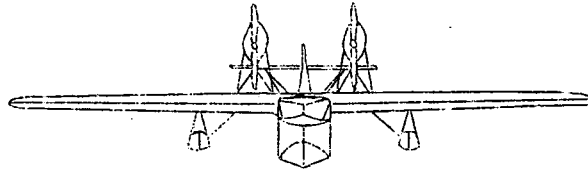
Lateral stabilizing is effected by floats built of "Alclad" on the same principle as the hull (Fig. 4).

In order to provide for beaching, a special landing gear is provided. This consists of a hollow axle built into the hull through which, when the seaplane is beached, a detachable axle is passed. The latter has aluminum wheels mounted in such a way that they can be brought into use by a cam action moved by hand levers.

C h a r a c t e r i s t i c s

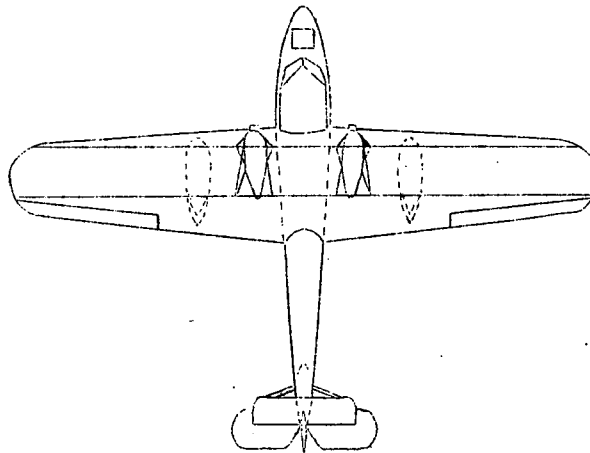
Span	45 ft.
Length over-all	34 ft. 4 in.
Height " "	11 " 2 "
Length of hull	32 "
Beam " "	4 "
Area of wings	320 sq.ft.
" " stabilizer	36 "
" " fin and rudder	20 "
Engines (2) "Hermes"	2 x 105 hp
Weight empty	2400 lb.

Weight loaded	3500 lb.
Fuel and oil	340 "
Normal load, passengers, pilot and luggage	760 "
Pay load	600 "
Surface loading	10.9 lb./sq.ft.
Power "	16.6 lb./hp
Speed, top	105 m.p.h.
" , cruising	85 "
Duration	4 hours
Pounds pay load per hp	2.86
hp per passenger	70



Span = 45'0"
Length = 34'4"
Height = 11'2"

Areas
Wing area = 320sq.ft.
Stabilizer = 36 " "
Fin & rudder = 20 " "



2 A.D.C.
105 hp
"Hermes"
engines

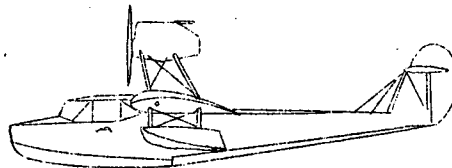
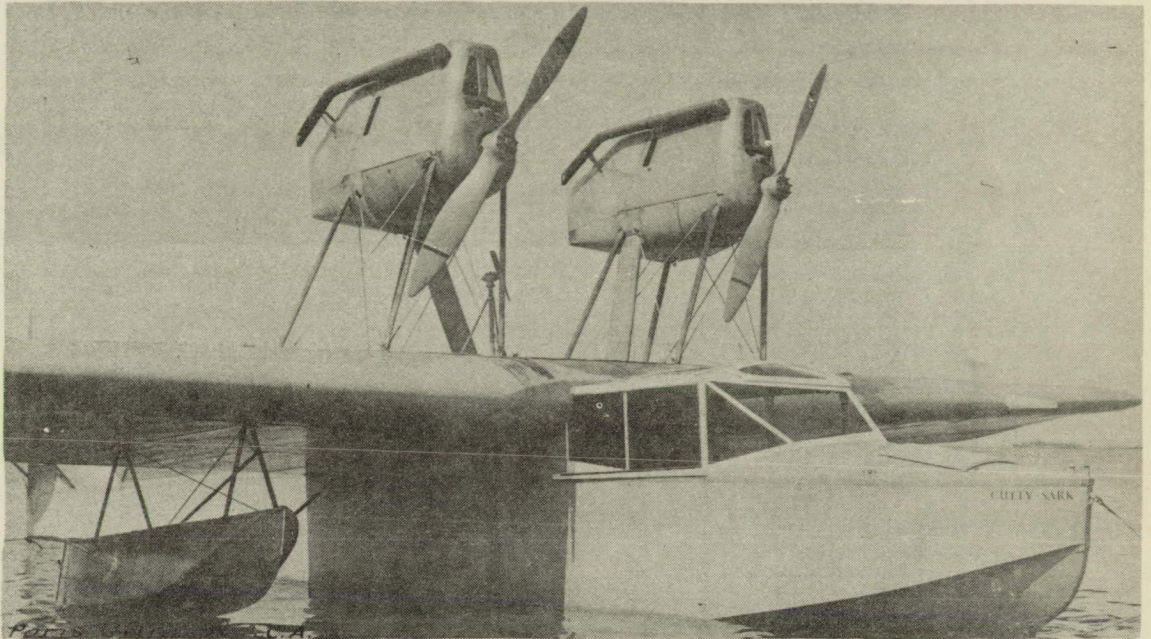
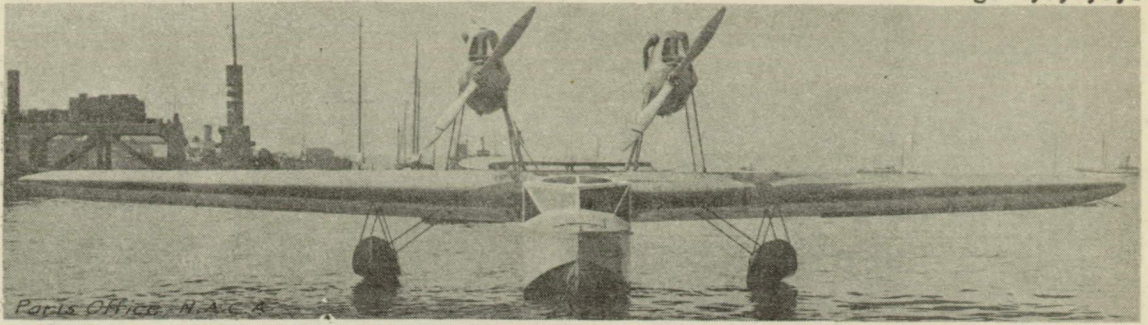


Fig.1 Saunders "Cutty Sark" seaplane.



Figs.2,3. Views of the Saunders "Cutty Sark" seaplane.

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Fig.5 Hinged back framework of seat. →

Fig.6 The water rudders on the "Cutty Sark" are mounted on the sides of the hull, and when operated together, form useful brakes.

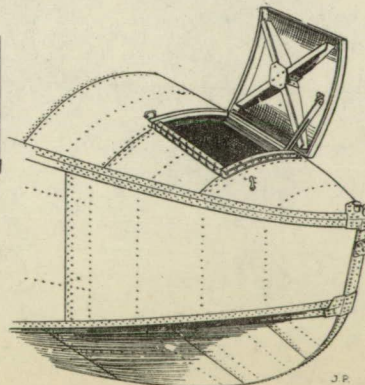
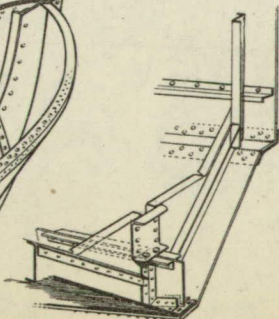
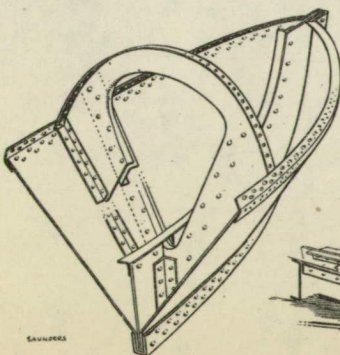
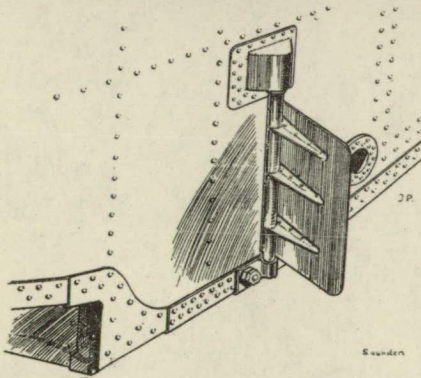
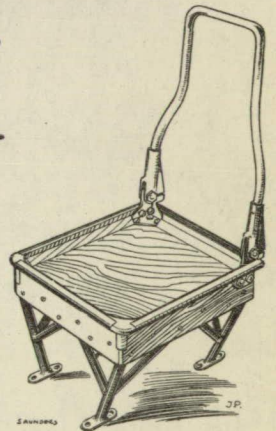


Fig.4 Details of the hull construction of the Saunders' "Cutty Sark." On the left a wing float, and on the right is shown the bows, with fore hatch open.