AIRCRAFT CIRCULARS

NATIONAL ADVISOEY COMMITTEE FOR AERONAUTICS

No. 125

THE SHORT "VALETTA" COMMERCIAL SEAPLANE (BRITISH)

A High-Wing All-Metal Twin-Float Monoplane

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THE SHORT "VALETTA" COMMERCIAL SEAPLANE (BRITISH).

An All-Metal High-Wing Twin-Float Monoplane.

The "Valetta" was built to the order of the Air Ministry as an experimental aircraft, with a view to testing the relative merits of the twin-float seaplane and the flying boat. It differs in more than its flotation members from the usual British flying boat. The "Valetta" is, in addition, a monoplane of all-metal construction, and equipped with a power plant comprising three Bristol "Jupiter" XI F geared engines (Figs. 2, 3, 4), and represents a radical departure from what has become orthodox British practice. From the fact that the new seaplane is of approximately the same gross weight as the "Calcutta," it should be relatively easy to obtain an illuminating comparison between the two, and to throw light on the question: Seaplane or Flying Boat?

The general layout of the "Valetta" is well shown in the general arrangement drawings (Fig. 1), from which it will be seen that the seaplane is a high-wing monoplane, in which the wing bracing is arranged in a somewhat unusual manner. Outriggers springing from the top and bottom longerons of the fuselage meet outboards in a point, and to this point are attached the wing-bracing struts and the float struts of the landing gear.

*From Flight, July 25, 1930.

(Details are shown in Fig. 9.) The whole forms a series of triangulated bays, statically stable and capable of transmitting loads in two directions. The two wing engines, it will be seen, are supported on the wing spars only; that is, there is no strutting to the outriggers. The floats are very widely spaced, and lateral stability on the water should be very good, although when running diagonally in a considerable seaway, the wide spacing of the floats might conceivably tend to swing the seaplane off its course.

The fuselage, although actually of large dimensions and giving full head-room, looks small in proportion to the large wing, and interference drag should not be excessive. (Fig. 7 shows details of fuselage construction.) That the minimum drag coefficient of the seaplane must be fairly small is shown by the fact that the top speed attained, that is, 135 m.p.h., corresponds, for the wing and power loading of the seaplane, to an Everling "high-speed" figure of 16, which must be regarded as high for a three-engined machine and especially in view of the fact that the machine is a seaplane.

In structural design, the "Valetta" follows fairly closely the "Calcutta." The fact that the former is a monoplane and has a fuselage, has necessarily meant changes in dimensions, but no very great changes in the constructional methods employed. The monoplane wing is of the normal two-spar type, the spars being of the usual Short construction, with flanges and webs of dural-

umin, corrugated for stiffness, and the flanges laminated to approach as closely as possible to uniform strength throughout. The ribs are girders of duralumin tube.

The fuselage construction of the "Valetta" resembles that of the hull in the "Calcutta." As shown in Figure 6, the transverse members or frames are continuous, while the fore-and-aft stringers are interrupted at the frames and secured to them by gusset plates. The planking, of sheet duralumin, is riveted to frames and stringers, as in the boat hulls.

The power plant of the "Valetta" consists of three of the new Jupiter series XI F engines, one of which type has, as recorded elsewhere in this issue, recently passed a very strenuous type test. One engine is mounted in the nose of the fuselage and the other two in streamline nacelles under the wing. In order to reduce the amount of vibration transmitted from the engines to the aircraft structure, a novel form of shock-absorbing or vibration-damper arrangement has been evolved. This consists in interposing between the engine plates and the supporting structure a series of rubber pads, as shown in Figure 8. The engines are, in fact, "floating on rubber," and the reduction in vibration which can be noticed in the cabin is very considerable. The gasoline tanks are housed in the wing, and give direct gravity feed to all three engines.

Engine starting is by means of a Bristol gas starter mounted on top of the fuselage, and when the seaplane is on the water

and the main engines not running, this engine is used for driving the general-purpose generator for lighting and wireless service. Hand-turning gear is also provided.

The duralumin floats, of typical Short form and construction, are of very large dimensions, as will be realized when it is pointed out that each float is nearly 40 feet long, while the displacement is 22,500 pounds. The floats are mounted on struts from the outer points of the outriggers, and are braced laterally by diagonal struts to the lower longerons. (Details of floats are shown in Fig. 10.)

Although primarily an experimental aircraft, the "Valetta" is completely equipped for passenger service. The cabin, which measures 17 ft. in length by 6 ft. 2 in. in width and 6 ft. in height, has seating accommodation for 16 passengers, but this number is subject to alteration according to the service for which the seaplane is required. The seats (Fig. 5) are similar to those used in the "Calcutta" and consist of a tubular framework, with air cushions for seats and backs, the air cushions being removable and so designed that they can be used as life belts in emergency.

The ventilation system has been carefully thought out, and the windows are set low in the side walls of the cabin so that passengers can look out and down on the sea without craning their necks (Fig. 5).

Aft of the cabin is a large lavatory fitted up with wash

basin, etc., and aft of that again is the luggage hold, which has a large hatch in the roof through which the luggage can be hoisted by means of a portable derrick carried on board. The luggage hold hatch also serves as an emergency exit for the passengers. Entrance to the cabin is by a door in the port side, and when boarding the seaplane from a launch, passengers walk up a narrow stairway formed on the side of one of the float struts.

Ahead of the cabin, and communicating with it by means of a sliding door, is the pilot's cockpit. This is situated near the nose of the fuselage, immediately behind the central engine, and from it a very good view in all directions is obtained. Provision is made for two pilots, placed side by side on seats which can be raised and lowered. The windshield surrounds the whole front portion of the pilots' cockpit, and a sliding panel is provided in the roof, while the side windows in the cockpit are made to slide. In the after part of the cockpit there is space for the wireless equipment, the "Valetta" being provided with transmitting and receiving apparatus. The equipment consists of a Marconi A.D.8 set, which has a range, under normal atmospheric conditions, of about 300-400 miles on C.W. telegraphy, and 200-250 miles on telephony.

The Short "Valetta" is probably the first British aircraft of its kind to have been designed primarily as a seaplane, but with a wheel-type landing gear designed concurrently. The sub-

stitution of wheels for the floats is a very simple affair, and for use on long air routes, such as over great portions of the British Empire, an operating company would benefit considerably by this interchangeability, as the one type of machine can be used on all stages of the route, the number of spares required being correspondingly reduced.

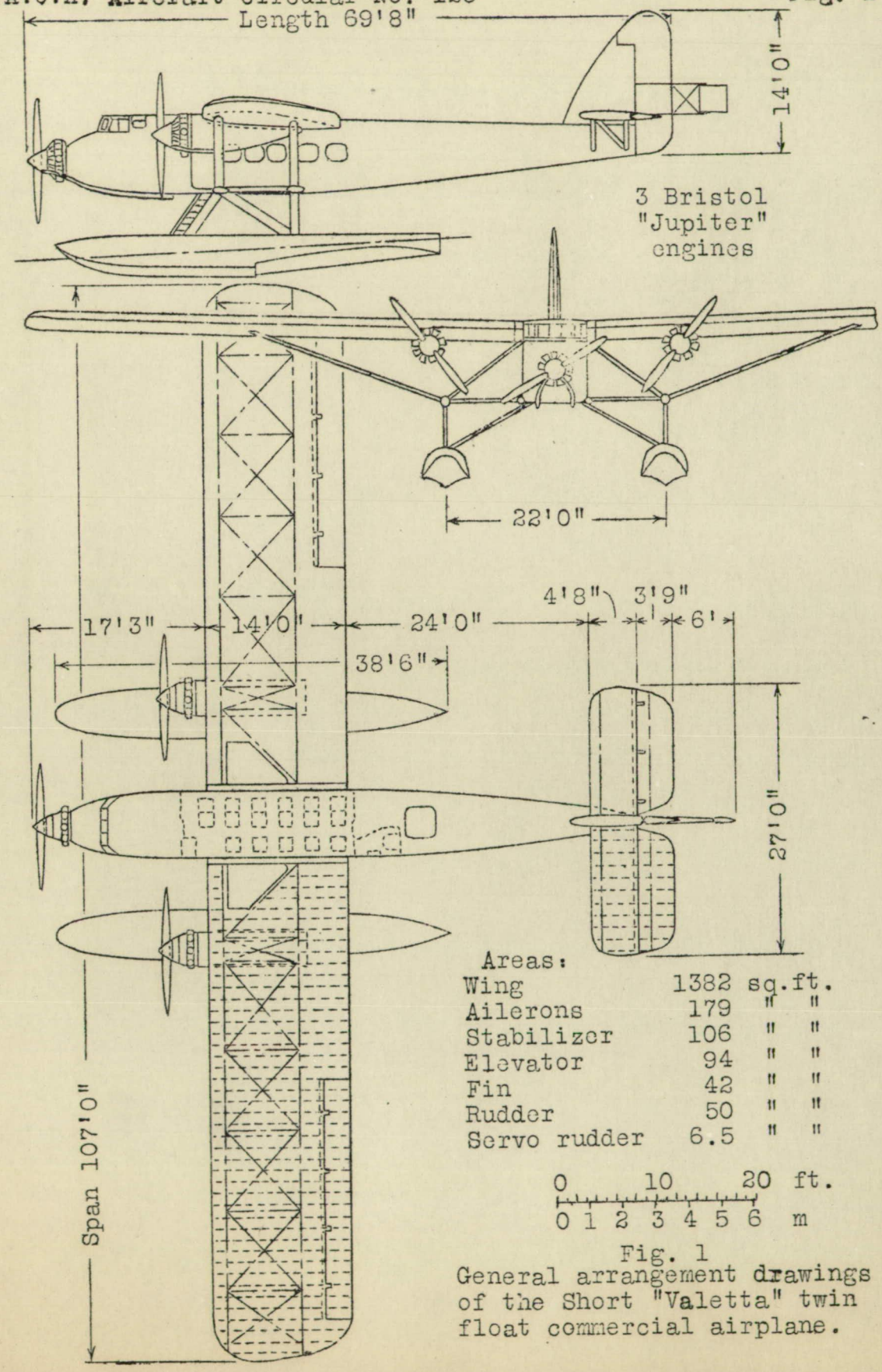
Characteristics

			Seaplane	Landplane
Length	69 ft. 8 in.			
Span	107 " 0 "			
Areas:				
Main wing	1382	sq.ft.		
Ailerons	179	"		
Stabilizer	106	"		
Elevators	94	"		
Fin	42	"		
Rudder	50	"		
Servo rudder	65	"		
Weight empty, including cabin equipment			6605 kg (14535 lb.)	6365 kg (13985 lb.)
Load:				
Crew and kit	660	lb.		
Passengers (16) and luggage	3360	"		
Wireless equipment	340	"		
Electrical "	75	"		
Instruments, marine equipment, fire extinguishers, and miscellaneous	430	"		
Fuel and Oil:				
Gas oline (350 gal.)	2730	"		
Oil (27 ")	270	"		
			3575 kg (7865 lb.)	
Gross weight			10180 kg (22400 lb.)	9940 kg (21850 lb.)

Performances

	Seaplane	Landplane
Maximum speed at sea level	217 km/h (135 m.p.h.)	138 m.p.h.
Cruising speed at 1800 r.p.m.	169-177 km/h (105-110 m.p.h.)	
Minimum speed	104.5 km/h (65.0 m.p.h.)	
Rate of climb at sea level	850 ft./min.	880 ft./min.
Time of climb to 10000 ft.	18.5 min.	17.5 min.
Service ceiling	4270 m (14000 ft.)	14800 ft.
Absolute ceiling	4880 m (16000 ft.)	
Range at cruising speed	835 km (520 miles)	

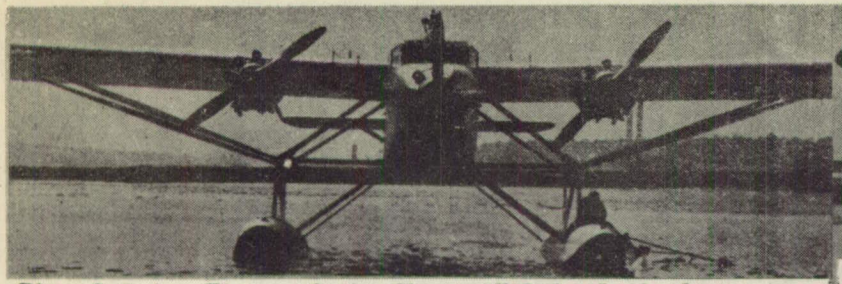
For the landplane, the other figures are very similar to those for the seaplane.



Areas:		
Wing	1382	sq.ft.
Ailerons	179	" "
Stabilizer	106	" "
Elevator	94	" "
Fin	42	" "
Rudder	50	" "
Servo rudder	6.5	" "

0 10 20 ft.
0 1 2 3 4 5 6 m

Fig. 1
General arrangement drawings of the Short "Valetta" twin float commercial airplane.



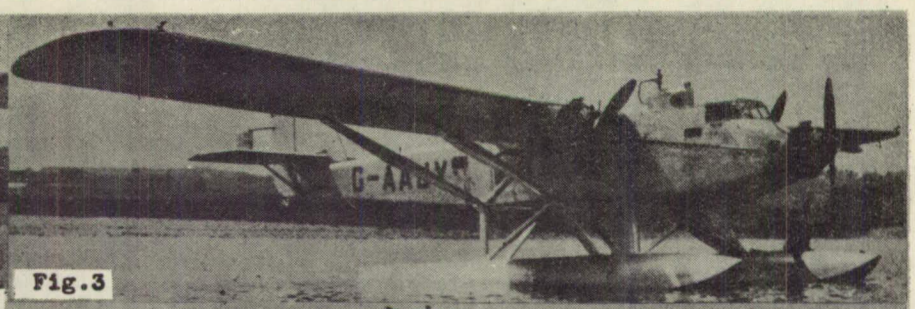


Fig.3

Fig.4

Figs.2,3,4. Views of the Short "Valetta" airplane: Approximately of the same weight and carrying capacity as the "Calcutta," this airplane is an interesting experiment to determine the relative merits of twin-float monoplane and ordinary flying-boat.

Fig.5 View inside the cabin, looking aft. Note that the windows are set low, so that passengers can look down without craning.

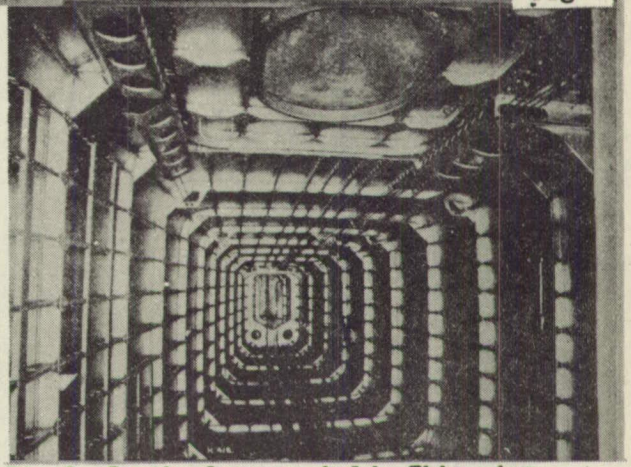


Fig.6 In the luggage hold: This view looking towards the stern, shows clearly the absence of obstructions inside the hull. The hull frames are not cut into, while the fore-and-aft stringers are interrupted at the frames and secured to them by gusset plates.

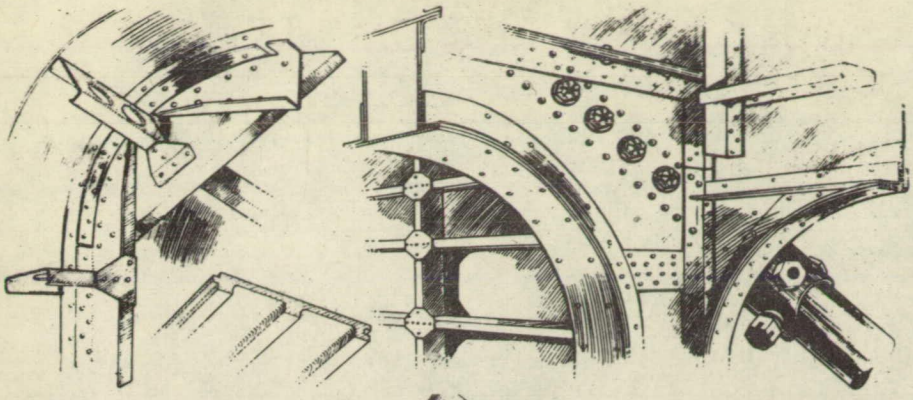


Fig.7 Details of the fuselage construction are shown on the left. Specially strong frames are used where the main wing spars join the body, as shown on the right.

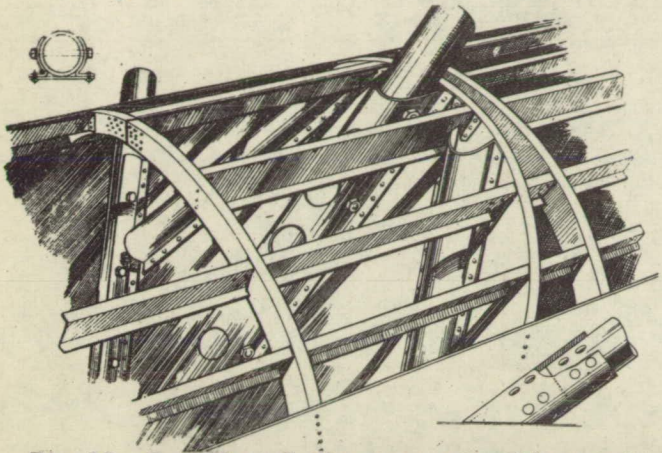


Fig.10 Details of float construction and of float strut attachments.

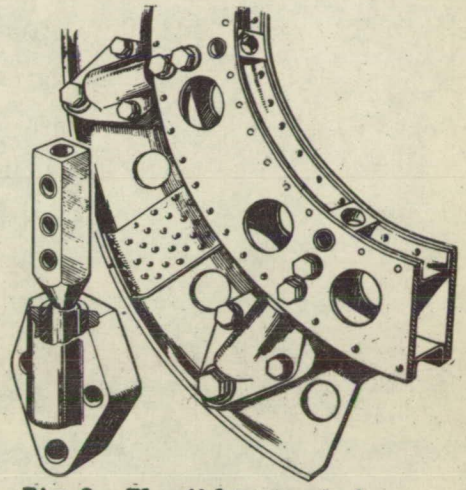
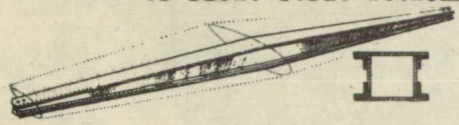
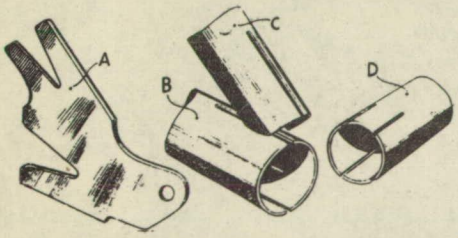


Fig.8 Flexibly mounted engines; rubber is interposed between the engine bearers and their support on the airplane structure in order to reduce the amount of vibration transmitted to the cabin, etc.





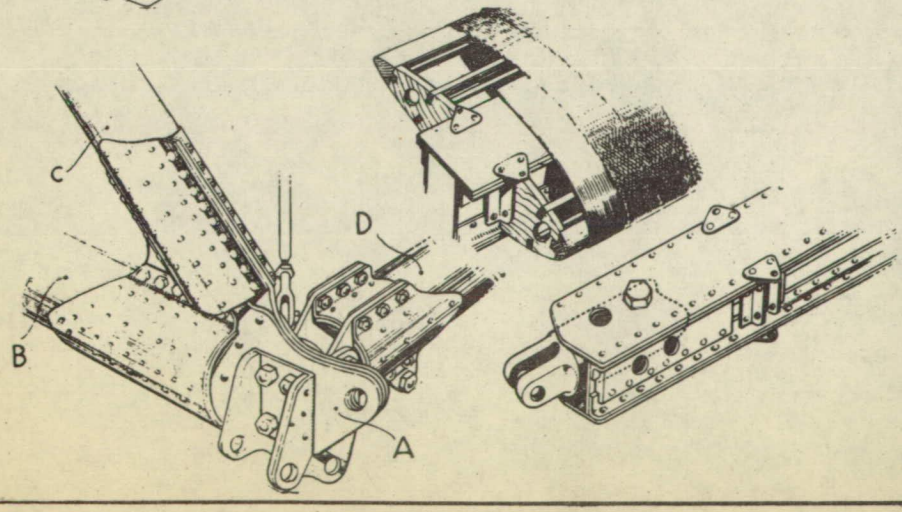


Fig.9 Outrigger strut bracing is used for wing and floats. The outrigger struts are of circular section, while the wing bracing struts are of built-up box section with a streamline fairing added. Details of the joint between outriggers, wing struts and float struts are shown analytically.