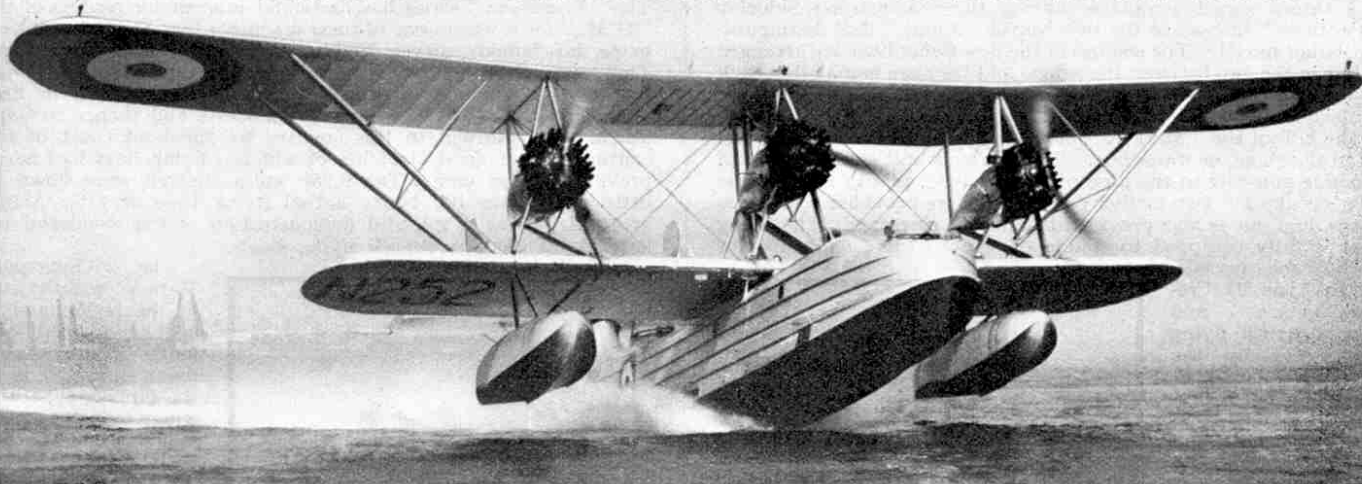


MODERN BRITISH FLYING BOATS



EFFORTS to design aeroplanes that could rise from water and alight on it were begun shortly after the development of the first successful land machines. In view of the close association of the British people with the sea, it is not surprising to find that the pioneer efforts in this direction were chiefly made in this country. An experimental flying boat was produced as early as 1909 by Messrs. Saunders of Cowes, now Saunders-Roe Ltd., and other interesting early flying boats produced by the same firm included an amphibian built in 1912 and the "Bat Boat," a biplane constructed in 1913.

During the war period, a long series of machines were produced by Messrs. Saunders, and other aircraft constructors who entered the field. Interest in flying boats grew steadily, but it was not until the close of the war that aircraft of this type received the attention they deserved. In the last few years wonderful advances have been made in their design. On

a large proportion of passenger air lines in all parts of the world it is necessary or advisable to fly over large expanses of water. Many large machines are already in use for this purpose, and there is no doubt that flying boats will not only maintain their present importance, but will become more and more essential as air travel develops. Machines of this type are now being used on certain sections of the London-Capetown air route. More will be needed when the present service to India is extended to the Far East and Australia, and of course, reliable flying boats will be required if the proposals to establish air lines across the Atlantic Ocean lead to practical results.

It is satisfactory to know that British designers and constructors of flying boats have produced machines that are among the safest and most efficient of their type in the world. These include great liners for use on airways, large and powerful machines intended for military purposes and smaller aircraft for the use of private owners and for the carriage of light merchandise or air mails.

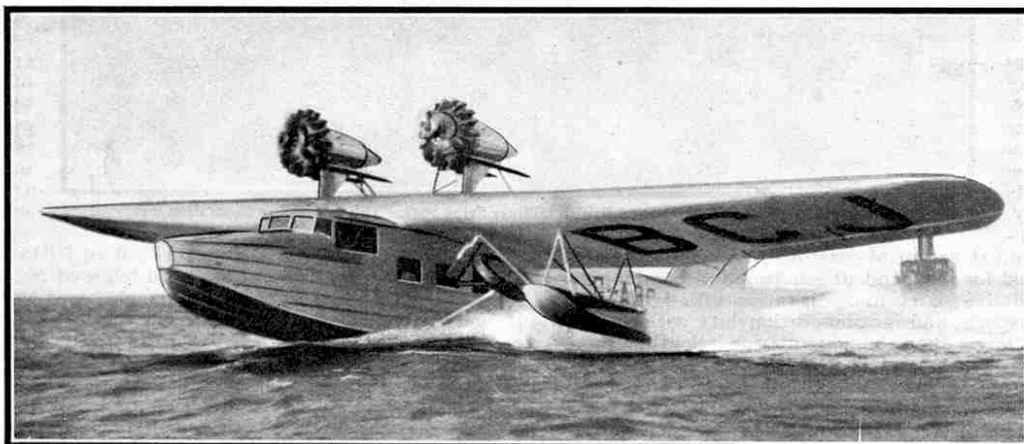
Flying boats are distinguished from seaplanes by the presence of a hull, seaplanes being provided with floats only. They may roughly be classed as military and civil. The dividing line between these two classes is not always very distinct, for in certain cases a boat

that was produced originally as a military machine has been modified in order to make it suitable for civil purposes. For instance, the design of the Short "Calcutta," a flying boat for commercial use, is based on that of the Short "Singapore," a military machine that has been largely used by the Royal Air Force.

At present three Squadrons in the Home Commands of the Royal Air Force employ flying boats. These are numbered 201, 204, and 209 respectively. No. 201 (Flying Boat) Squadron is equipped with Supermarine "Southamptons" and is stationed at Calshot, while the remaining squadrons have their bases at Mount Batten and make use

of Blackburn "Iris" machines.

The Supermarine "Southampton" with which the squadron stationed at Calshot is equipped is a five-seater reconnaissance flying boat fitted with two 470 h.p. Napier "Lion" engines. It is of the biplane type and although the earlier models were constructed throughout of wood, an all-metal one is



The Saro "Cloud" amphibian. The landing gear of this machine can be seen raised above the water below the wing. The illustration is published by courtesy of Saunders Roe Ltd., while we are indebted to the Supermarine Aviation Works Ltd. for permission to reproduce the photograph of the Supermarine "Southampton Mark X" at the top of the page.

now available. The boat is fully equipped with wireless apparatus, and hammocks and cooking requisites may also be carried in order that long non-stop flights may be made.

It is interesting to know that a number of long distance flights in formation have been made by squadrons of the R.A.F. equipped with Supermarine "Southamptons." The most famous of these took place in 1929, when an aerial journey of no less than 27,000 miles was undertaken. The squadron concerned flew from England to India and on to Singapore. From that centre an extended flight was made round Australia to Hong Kong and back again to Singapore, the entire flight being carried out without mishap. Last year a flight of "Southamptons" cruised over the Baltic, covering a total distance of 3,300 miles with perfect regularity.

The span of the Supermarine "Southampton" is 75 ft., and it is 49 ft. 8 in. in length, and 18 ft. 7 in. in height. The empty weight of the machine when made of wood is 9,210 lb., and this is reduced to 8,760 lb. when a metal hull is fitted, the fully loaded weight of the second of these models being 14,600 lb. The maximum speed of the machine is 108 m.p.h., its landing speed is 52 m.p.h., and it has a range of action of 800 miles. It is capable of climbing to a height of 5,000 ft. in 10 mins. and its service ceiling is 14,000 ft.

The most recent development of the Supermarine "Southampton" is the machine illustrated in the heading of this article. This splendid flying boat is called the "Southampton Mark X." Full details of the machine are not at present available, but it appears to be a little larger than the early "Southampton," and it is a three-engined aeroplane, having three Armstrong Siddeley "Panthers" instead of the two Napier "Lions" that distinguish the earlier model. The engines of the new flying boat are arranged in line in the gap between the wings, and they are mounted in such a manner that they may be changed while the machine is afloat.

The hull of the "Mark X" model is flanked with stainless steel up to the chine, or water line. There is a cockpit equipped with a machine gun ring in the nose of the machine, just in front of the pilot's cockpit. Two further gun cockpits are provided behind the wings, and one is also provided behind the elevators. The flying boat is fully equipped to enable the crew to live on board for considerable periods.

The "Iris III" reconnaissance and coastal patrol flying boat used by the Squadrons based at Mount Batten is produced by the Blackburn Aeroplane and Motor Co. Ltd. It also is of the biplane type and is fitted with three Rolls-Royce "Condor III" water-cooled engines. The earliest model of the machine was produced in 1926. The "Iris Mark III" retains the chief characteristics of its predecessors but includes many interesting improvements. Of these the two most important are the use of a structure that is constructed entirely of metal, with the exception of fabric wing covering, and the provision of enlarged fuel tanks. Owing to its large fuel capacity, the machine is capable of patrolling a great extent of coast line, and has a very long range when employed for independent scouting and bombing purposes. It is also suitable for use in co-operation with surface craft as an escort for transports, and for observation duty with the fleet.

The "Iris III" is larger than the Supermarine "Southampton," its span being 97 ft. and its overall length 67 ft. 4 in. It is 25 ft. 6 in. in height, and its normal tare weight is 19,301 lb. The gross weight of the machine is 29,000 lb. and it carries a military load of 2,800 lb.

The maximum speed of the "Iris III" at sea level is 105 knots (120 m.p.h.) and at a flying speed of 80 knots (92 m.p.h.) it has a range of 992 sea miles (1,140 geographical miles). Its landing speed is 60 m.p.h. By ascending to a height of 5,000 ft. the range of flight may be increased to 1,070 nautical miles (1,232 geographical miles). The initial rate of climb of the machine is 630 ft. per min. and it is capable of reaching a height of 10,000 ft. in 31½ mins.

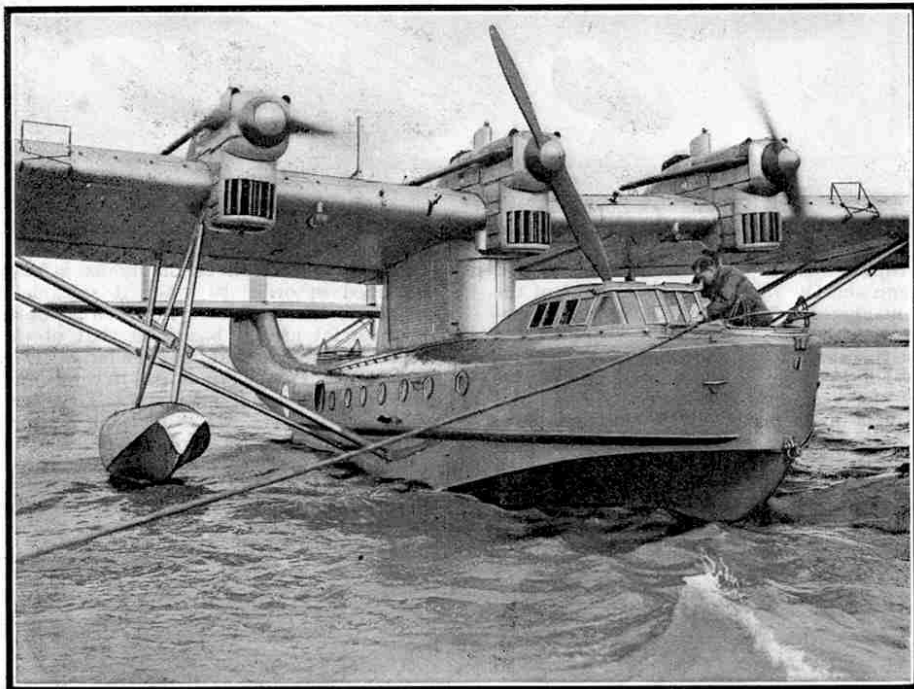
It has already been pointed out that progress in flying boat design has been very rapid in recent years, and now the "Iris III" has been surpassed in performance by the "Sydney" a larger flying boat that also is manufactured by the Blackburn Aeroplane and Motor Co. Ltd. This is of the monoplane type and is the largest military flying boat of this type in the country. It is constructed entirely of metal, with the exception of fabric covering on the wings and tail unit, and the hull has a deep forefront and is well flared in order to keep down the spray. Above the water line its sides are nearly perpendicular, thus giving a roomier interior than that of the "Iris III," in which the sides slope inward toward the deck at a noticeable angle. The machine has two steps and from the second the lines sweep upward to the stern, where the tail defence machine gun station is provided behind the tail plane. An unusual feature of the machine is that there are no fins at the rear.

The formation of the wings gives the Blackburn "Sydney" in flight the appearance of a giant gull, for the centre plane has a dihedral angle and the outer planes taper to the tips. Details of its performance may not yet be published, but the machine is thought

to have a maximum speed of more than 120 m.p.h. It is designed for scouting work and patrol duties, either independently or in co-operation with sea-going craft, and carries a crew of five.

A very interesting British flying boat that has an excellent record for reliability under all conditions is the Short "Singapore." The "Singapore" series has particular interest for readers of the "M.M.," for it was in one of these machines that Sir Alan Cobham made his famous survey flight round Africa three years ago. The course followed by Sir Alan on his outward journey was by the Nile Valley to British East Africa, after which he flew above the chain of great lakes to Rhodesia and thence to Cape Town. He returned to this country by the west coast of the continent, over great stretches of which a flying boat had never previously been seen. The 9,950 miles covered were flown in little more than 100 hours' actual flying time, and Sir Alan's great flight was a splendid demonstration of the wonderful reliability of modern British flying boats.

The "Singapore Mark I" was the first of the series, and is a twin-engined all-metal long distance flying boat. It is of the biplane type, the wings being unequal in span, and is fitted with two Rolls-Royce "Buzzard" engines that give it a maximum speed of 128 m.p.h. at cruising speed. The "Singapore Mark I" has a range of 900 miles. It takes ten seconds only to rise from the water and is capable of climbing to a height of 10,000 ft. in 13 minutes. When empty it weighs 12,955 lb., and for service use carries a crew of five, two of whom are pilots and there are three gunners' cockpits, of which one is in the nose and the other two behind the wings. The loaded weight of the machine



Mooring the Blackburn "Sydney," the largest British military flying boat. This interesting illustration is reproduced by permission of the Editor of "Flight."

is 20,000 lb., giving a disposal load of 7,045 lb.

The "Mark I" model has been followed by a Short "Singapore Mark II," in which the improvements based on the wide experience gained on machines of the original type have been incorporated. The new machine is believed to be the fastest flying boat in the world. It has four Rolls-Royce "Kestrel II" engines mounted in tandem pairs in the gap between the wings. It is interesting to find that no struts are used to brace the interplane engine struts to the boat hull, the weights of the engines being taken by thick wing roots built integral with the hull. As is the case with other flying boats recently introduced for military purposes, details of the performance of the "Singapore Mark II" cannot yet be divulged.

The only small civilian flying boats constructed in this country are the interesting range of machines of this type made by the well-known firm of Saunders-Roe & Co. Ltd. They are the "Cutty Sark," the "Windhover" and the "Cloud." These resemble each other in general design, the chief variations being in size, the layout of the cabins and the engines installed. They are of the high wing monoplane type and have graceful lines and well streamlined hulls. In each machine the engines are carried in nacelles mounted on struts some distance above the wing, where they are clear of spray thrown up when taxi-ing or landing. In each case a choice of engines is available. For instance, the "Cutty Sark" may be equipped with any engine or engines with a total output of about 200 h.p., while the "Windhover" and the "Cloud" may be equipped with one, two or three engines developing a total of approximately 300 to 350 h.p., and 600 to 650 h.p. respectively. The machines may be obtained as ordinary flying boats or as amphibians.

The smallest of the Saro machines is the "Cutty Sark," which is a small four-seater cabin boat. With a span of 45 ft. and an overall length of 34 ft. 4 in., it weighs 2,430 lb. when empty and has a loaded weight of 3,700 lb. The machine may be used for

various purposes, including pioneer work on new air routes in districts where land-locked harbours and navigable rivers exist, aerial photography and survey, fire fighting and also passenger or mail carrying.

The engines with which the "Cutty Sark" is usually equipped are two "Cirrus Hermes" or two of the "Gipsy II" type, giving a total horse power of 210, or one Armstrong Siddeley geared "Lynx" developing 215 h.p. The amphibian type has a maximum speed of 100 m.p.h., when fitted with two "Gipsy II" engines and cruises at 85 m.p.h. It climbs at the rate of 500 ft. per minute and has a ceiling of 9,000 ft.

The next largest boat is the "Windhover," which is a six-seater. This is usually fitted with two Armstrong Siddeley "Mongoose" engines, which give it a maximum speed of about 103 m.p.h., a cruising speed of about 88 m.p.h. and an endurance of 4 hours. The boat is 41 ft. 4 in. in overall length and has a wing span of 54 ft. 4 in. The weight empty is 3,682 lb. and the total weight is 5,270 lb. The disposable load is 1,588 lb.

After the "Windhover" comes the Saro "Cloud," seating from eight to ten persons. The chief features of this machine closely resemble those of the smaller boats, except that experimental features are minimised and that full advantage has been taken of experience gained on the smaller machines. This vessel is usually fitted with two Armstrong Siddeley "Double-Mongoose" engines or two Wright "Whirlwinds," but if a triple-engined machine is required Armstrong Siddeley "Lynx" engines may be used.

The wing span of the "Cloud" is 64 ft. and the overall length 49.75 ft. The overall height is 13.3 ft. and when the landing wheels are employed the wheel track is 14 ft. The amphibian machine, when fitted with "Double-Mongoose" engines, has a tare weight of 6,150 lb., the useful and payload loads being 3,350 lb. and 1,850 lb. respectively, and the all-up weight 9,500 lb. The maximum speed of the machine is 117 m.p.h. and it cruises at 100 miles an hour. Its climbing rate is 850 ft. per minute, and the service ceiling 11,000 ft. Fuel and oil tanks giving an endurance of four hours are standard, but extra ones to enable the machine to remain in the air for six hours can be provided if desired.

The only other commercial flying boats at present in production in this country are the Short "Calcutta" and the Short "Kent." The Short "Calcutta" was the first British all-metal commercial flying boat to be produced. It was modelled on the lines of the military "Singapore" flying boat constructed by the same firm, and in designing it advantage was taken of the experience gained during Sir Alan Cobham's flight round Africa in a flying boat of that

type, to which reference has already been made.

The Short "Calcutta" is employed on the Mediterranean section of Imperial Airways, London-Karachi air route. It is a 14-seater biplane machine fitted with three engines carried in nacelles mounted between the wings. Both wings are above the hull of the boat and thus the passengers are able to obtain an excellent view from the cabin. The machine has a cruising speed of 100 m.p.h. and a normal range of 6½ hours. The payload plus the crew is 4,860 lb.

and a feature of the machine is that no petrol is carried inside the hull, thus diminishing the risk of fire. The three engines employed are Bristol "Jupiters."

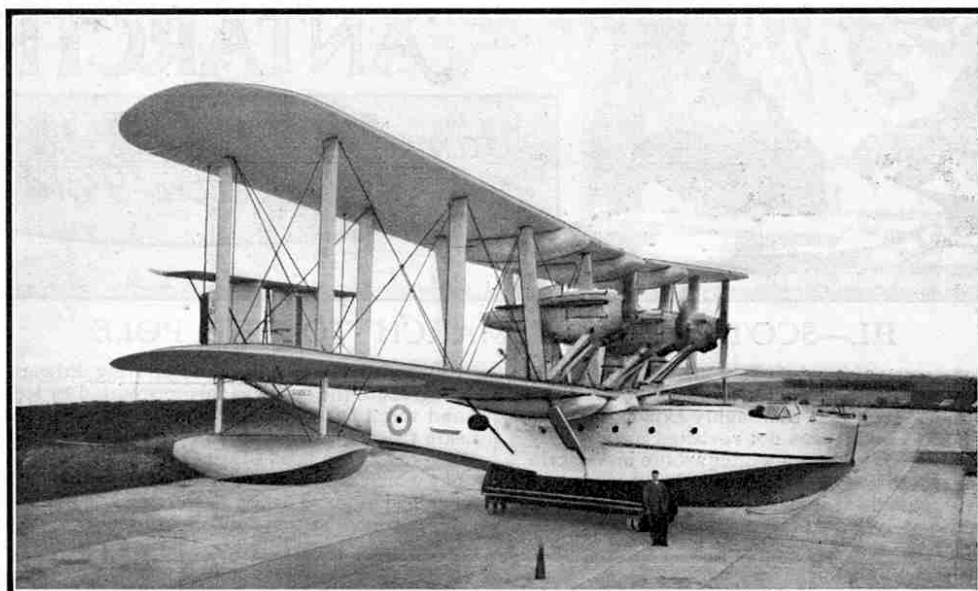
The latest British commercial flying boat to be completed is the Short "Kent," which also has been produced for Imperial Airways. A brief description of this machine was given on page 310 of the "M.M." for April, and a photograph of the machine appears on page 367 in the "Air News" of this issue. The "Kent" has been developed from the

"Calcutta" flying boat. It is considerably larger than the earlier machine, the span of the upper wing of the "Calcutta" being approximately the same as that of the lower one of the new flying boat. The engines are carried similarly to those of the "Calcutta", but there are four instead of three, and they are supported on struts in the gap between the wings. The "Kent" accommodates 16 passengers and their luggage in addition to a crew of four made up of a pilot, a pilot-mechanic, a wireless-operator-navigator, and a steward. A striking feature of the new machine is that the planing bottom of the hull is planked with stainless steel up to a little above the waterline. This makes its initial cost heavier but it is expected that the cost of operation of the machine will be reduced because of the greatest durability attained.

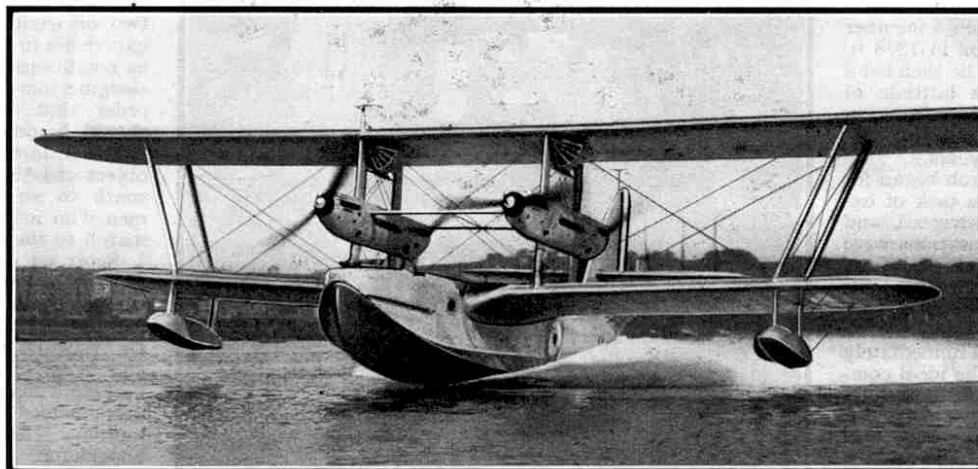
The "Kent" has an estimated maximum speed of 132 m.p.h. at a height of 5,000 ft. and it is expected to cruise at about 100 m.p.h. The

landing speed will be 60 m.p.h. Its initial rate of climb is put at 760 ft. per minute, and the time required to reach a height of 10,000 ft. will be 14 minutes. The boat has been designed to operate at a service ceiling of 19,000 ft. and to take off with a full load in a calm sea in 18 seconds. Its endurance when fitted with standard petrol tanks should be five hours, but by the use of additional tanks this can be increased to eight hours, during which 800 miles could be covered.

British firms specially interested in the construction of flying boats are unsparing in their efforts to improve them, and new types are continually being produced in which good use is made of experience gained with existing machines. Interesting new civilian boats now under construction include



The Blackburn "Iris III" on the slipway. For the photograph of this machine, which is fitted with three Rolls-Royce "Condor" engines, we are indebted to the courtesy of the Blackburn Aeroplane and Motor Co. Ltd.



The Short "Singapore Mark II" taxiing preparatory to taking off. The four Rolls-Royce "Kestrel II" engines mounted in tandem are clearly shown. This illustration is published by courtesy of Short Bros. (Rochester & Bedford) Ltd.

(Continued on page 437)