SEALAND in the air

Impressions of a Versatile Amphibian . . . . . . By E. A. G. RUMBELOW

IT would be difficult indeed to find another aircraft, in any category of type, size or price, capable of such an extensive range of useful applications as is the Short Sealand amphibian. That the need for a machine of its kind exists is a fact which has, perhaps, become most apparent in post-war years, when the inhabitants of outlying or inaccessible parts of the earth's surface have found it an increasingly difficult matter to keep pace with the general speeding-up of communications between more progressive regions. In countless territories of differing topography and varying climatic conditions the use of amphibians such as the Sealand can be the means of exerting a powerful influence on the economic and social lives of local communities.

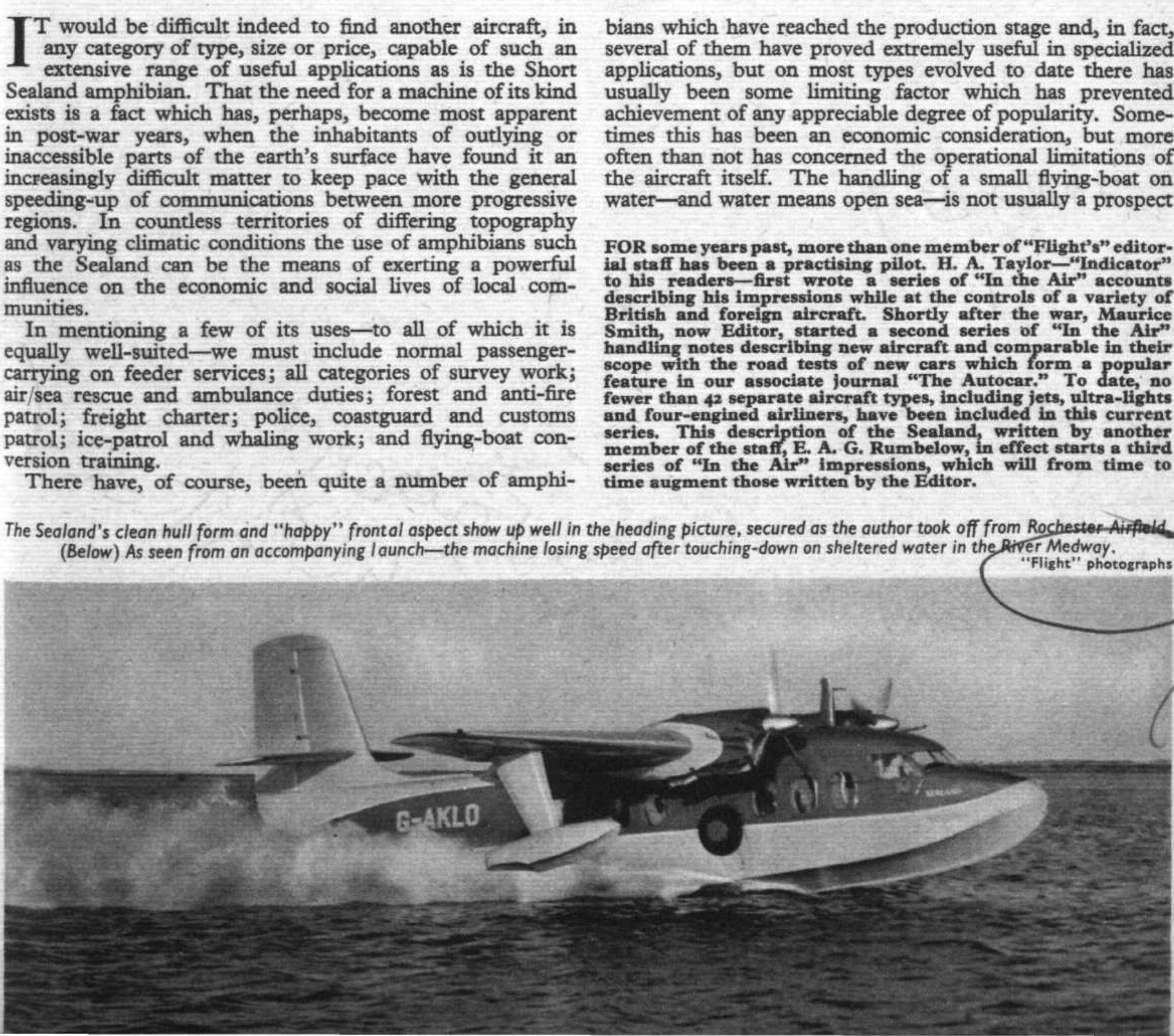
In mentioning a few of its uses—to all of which it is equally well-suited—we must include normal passenger-carrying on feeder services; all categories of survey work; air/sea rescue and ambulance duties; forest and anti-fire patrol; freight charter; police, coastguard and customs patrol; ice-patrol and whaling work; and flying-boat conversion training.

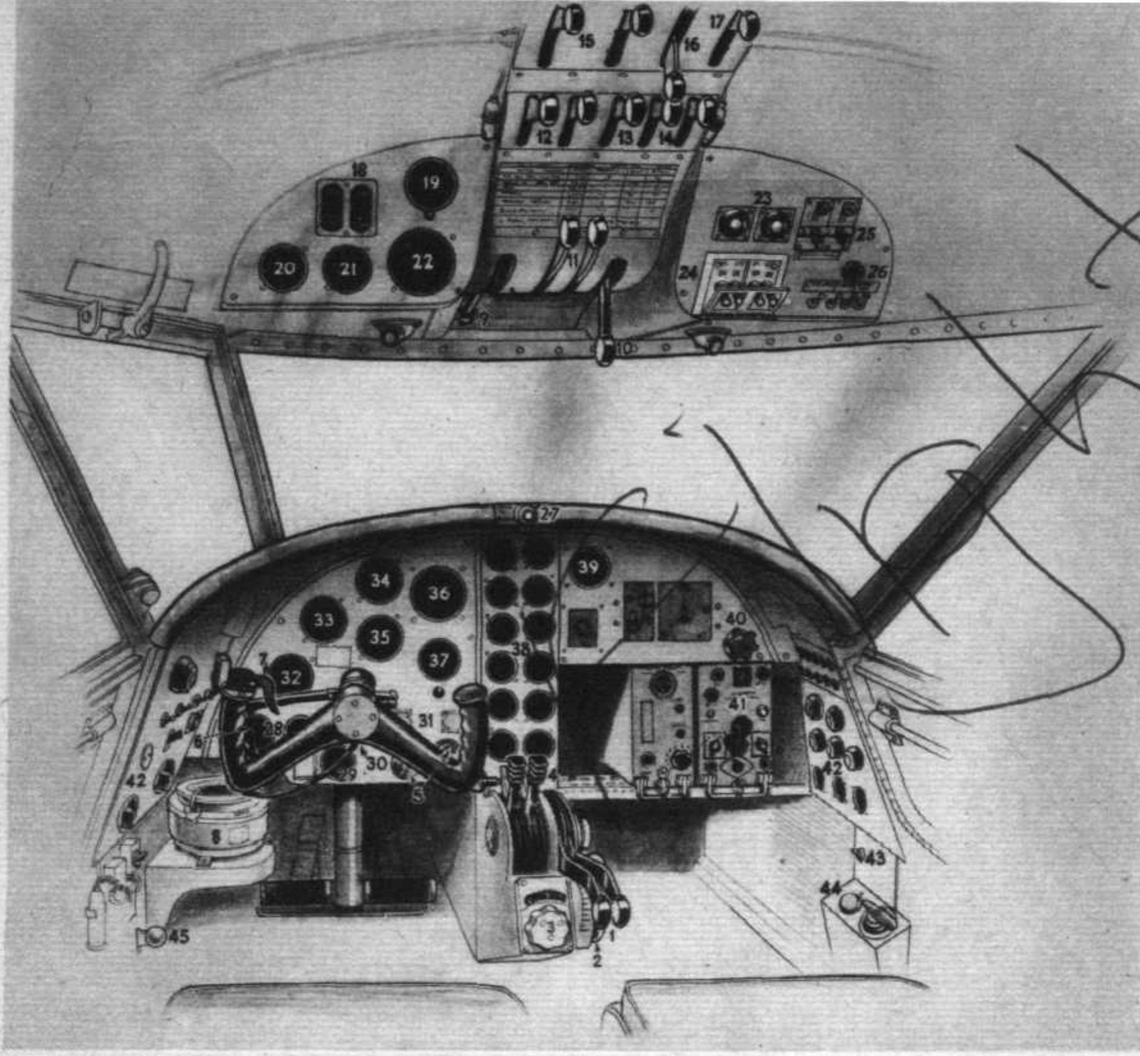
There have, of course, been quite a number of amphibians which have reached the production stage and, in fact, several of them have proved extremely useful in specialized applications, but on most types evolved to date there has usually been some limiting factor which has prevented achievement of any appreciable degree of popularity. Sometimes this has been an economic consideration, but more often than not has concerned the operational limitations of the aircraft itself. The handling of a small flying-boat on water—and water means open sea—is not usually a prospect

FOR some years past, more than one member of "Flight's" editorial staff has been a practising pilot. H. A. Taylor—"Indicator" to his readers—first wrote a series of "In the Air" accounts describing his impressions while at the controls of a variety of British and foreign aircraft. Shortly after the war, Maurice Smith, now Editor, started a second series of "In the Air" handling notes describing new aircraft and comparable in their scope with the road tests of new cars which form a popular feature in our associate journal "The Autocar." To date, no fewer than 42 separate aircraft types, including jets, ultra-lights and four-engined airliners, have been included in this current series. This description of the Sealand, written by another member of the staff, E. A. G. Rumbelow, in effect starts a third series of "In the Air" impressions, which will from time to time augment those written by the Editor.

The Sealand's clean hull form and "happy" frontal aspect show up well in the heading picture, secured as the author took off from Rochester Airfield. (Below) As seen from an accompanying launch—the machine losing speed after touching-down on sheltered water in the River Medway.

"Flight" photographs





1. Throttles
2. Elevator trim
3. Rudder trim
4. Airscrew pitch
5. Feathering buttons
6. Brakes
7. Lift-spoiler control
8. P.11 magnetic compass
9. Flaps
10. Undercarriage
11. Slow-running cut-outs
12. Carburettor cocks
13. Fuel balance cock
14. Fuel-tank cocks
15. Engine air shutters
16. Carburettor air shutters
17. Cabin heating
18. Tailwheel position
19. Clock
20. Flap position
21. Undercarriage position
22. Brakes/bottle pressure
23. Starter buttons
24. Ignition switches
25. Generator switches
26. Fuel gauge, battery, instrument master switch and power-failure warning light
27. Press to transmit
28. Fuel gauges
29. Outside air temperature
30. Vacuum gauge
31. Fire-suppression buttons
32. Height
33. A.S.I.
34. Rate-of-climb
35. Turn-and-slip
36. Artificial horizon
37. Directional gyro
38. Engine instruments
39. Relative-bearing indicator
40. Vacuum change-over cock
41. MF/DF installation
42. Switch and dimmer panels
43. Priming isolation switch
44. Fuel selector and primer
45. Lift-spoiler emergency retract

The Sealand's cockpit offers good vision and a neat and practical layout with every control conveniently near the pilot's hands.

which is contemplated with any marked enthusiasm by the pilot. Similarly, the amphibian's configuration does not normally lend itself to the provision of ideal handling characteristics for take-offs from, or landings on, *terra firma*.

Recently I was able to try out the Sealand with the object of comparing it with previous amphibians I had flown. I did so, I must confess, with an unjust suspicion in my mind that it would prove to have some failing or characteristic which the impressive sales brochures omitted to mention, and which, as I have implied above, would just prevent the type from gaining the proud distinction of being referred to as "a pilot's aircraft."

After two flights from Rochester (Short's demonstration base in this country) I must say that the Sealand more than deserves such a compliment. It is literally viceless, possessed of adequate stability in all planes and, if properly handled, fully as gentle as the proverbial Anson. Before these impressions are analysed in detail, however, it may be worthwhile to include a brief description of the aircraft, in order to understand more readily the actual techniques involved in flying it.

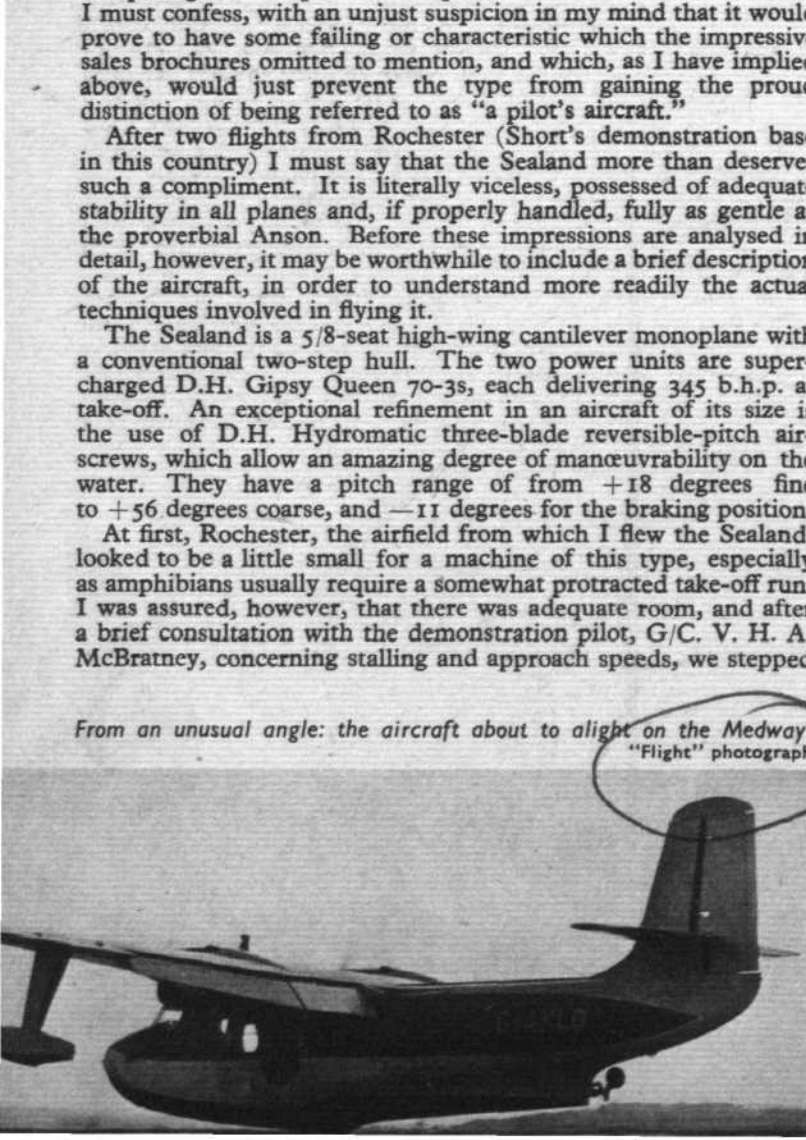
The Sealand is a 5/8-seat high-wing cantilever monoplane with a conventional two-step hull. The two power units are supercharged D.H. Gipsy Queen 70-3s, each delivering 345 b.h.p. at take-off. An exceptional refinement in an aircraft of its size is the use of D.H. Hydromatic three-blade reversible-pitch airscrews, which allow an amazing degree of manœuvrability on the water. They have a pitch range of from +18 degrees fine to +56 degrees coarse, and −11 degrees for the braking position.

At first, Rochester, the airfield from which I flew the Sealand, looked to be a little small for a machine of this type, especially as amphibians usually require a somewhat protracted take-off run. I was assured, however, that there was adequate room, and after a brief consultation with the demonstration pilot, G/C. V. H. A. McBratney, concerning stalling and approach speeds, we stepped aboard G-AKLO. Inside, the two cabins (separated by the undercarriage "boxes") gave a feeling of adequate room, and the large windows should also please passengers. Up to eight seats can be fitted (this, the demonstrator, had five) but if the rear starboard seat is sacrificed a toilet can also be installed. A full cabin air-conditioning system is incorporated, with adjustable outlets at each seat position.

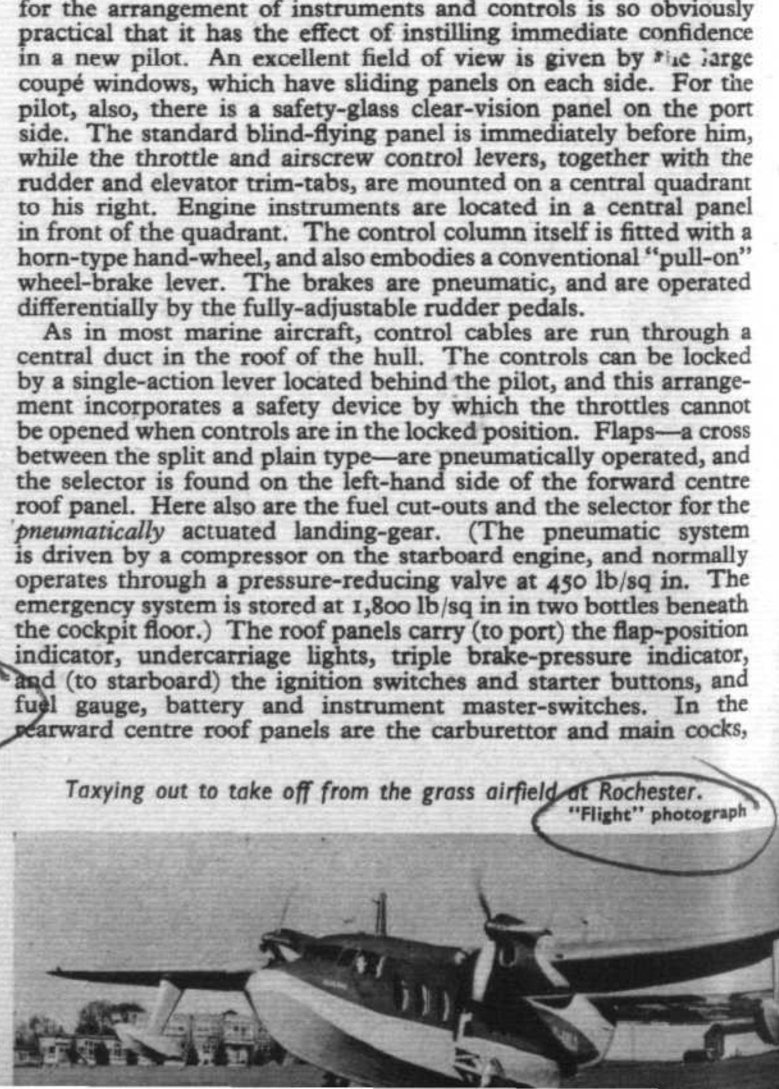
Entering the cockpit for the first time is a pleasant experience, for the arrangement of instruments and controls is so obviously practical that it has the effect of instilling immediate confidence in a new pilot. An excellent field of view is given by the large coupé windows, which have sliding panels on each side. For the pilot, also, there is a safety-glass clear-vision panel on the port side. The standard blind-flying panel is immediately before him, while the throttle and airscrew control levers, together with the rudder and elevator trim-tabs, are mounted on a central quadrant to his right. Engine instruments are located in a central panel in front of the quadrant. The control column itself is fitted with a horn-type hand-wheel, and also embodies a conventional "pull-on" wheel-brake lever. The brakes are pneumatic, and are operated differentially by the fully-adjustable rudder pedals.

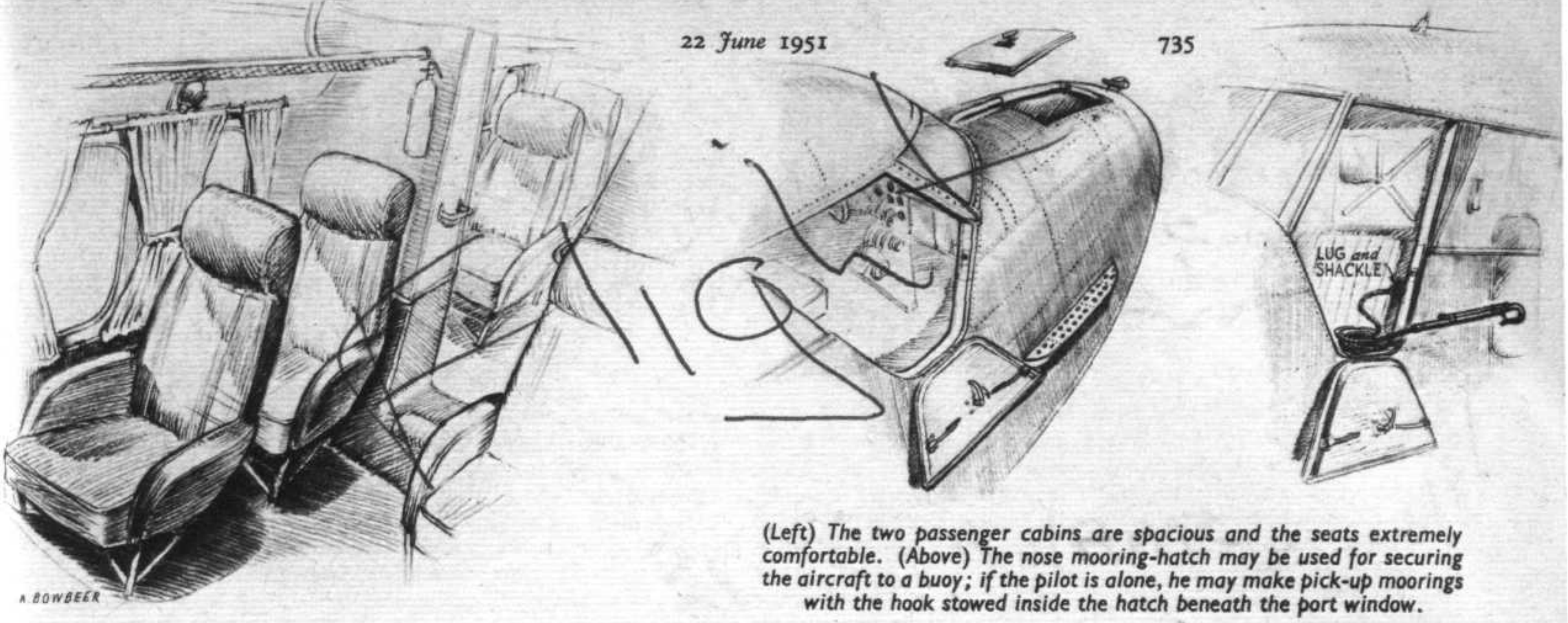
As in most marine aircraft, control cables are run through a central duct in the roof of the hull. The controls can be locked by a single-action lever located behind the pilot, and this arrangement incorporates a safety device by which the throttles cannot be opened when controls are in the locked position. Flaps—a cross between the split and plain type—are pneumatically operated, and the selector is found on the left-hand side of the forward centre roof panel. Here also are the fuel cut-outs and the selector for the *pneumatically* actuated landing-gear. (The pneumatic system is driven by a compressor on the starboard engine, and normally operates through a pressure-reducing valve at 450 lb/sq in. The emergency system is stored at 1,800 lb/sq in in two bottles beneath the cockpit floor.) The roof panels carry (to port) the flap-position indicator, undercarriage lights, triple brake-pressure indicator, and (to starboard) the ignition switches and starter buttons, and fuel gauge, battery and instrument master-switches. In the rearward centre roof panels are the carburettor and main cocks,

From an unusual angle: the aircraft about to alight on the Medway. "Flight" photograph



Taxying out to take off from the grass airfield at Rochester. "Flight" photograph





(Left) The two passenger cabins are spacious and the seats extremely comfortable. (Above) The nose mooring-hatch may be used for securing the aircraft to a buoy; if the pilot is alone, he may make pick-up moorings with the hook stowed inside the hatch beneath the port window.

together with a balance cock for the two 60-gallon fuel tanks (100-octane fuel is used). Moving aft again, we find the engine and carburettor air-shutter levers and the cabin-heating control. The engine priming panel, vacuum selector and most of the remaining electrical switches are located on the starboard side of the cockpit. A leading-edge lift-spoiler can be operated from the control column to help lift the starboard float clear of the water when taking off from glassy sea—of this more anon.

After carrying out the normal control and pneumatic-system checks, I prepared to start the Gipsy Queens. No priming is required in warm conditions, and the carburettor air intake should be opened unless the aircraft is standing on loose-surface ground. With the throttles about an inch open, the engines fired quickly. Warming-up is carried out at 1,200 r.p.m. and normal engine readings are: oil temperature, 60 deg C; oil pressure, 55 lb/sq in; cylinder-head temperature, 250 deg C; fuel pressure, 27 lb/sq in. The run-up to maximum boost (+6 lb/sq in) should give 2,800 r.p.m., and magnetos are checked at 2,700 r.p.m.; drop should not exceed 135 r.p.m.

Airscrews should be exercised throughout their range, and also checked in the braking position. For reverse pitch, the safety-gate pin at the front of the quadrant must be extracted and the control levers moved fully forward with the safety catches raised (for this operation r.p.m. should not exceed 1,200). Positive pitch is regained by moving the levers to the "feather" position, whereupon the revs will drop to 500 and oil pressure will rise as the blades contact the coarse-pitch stops. After a few seconds, the control levers can be moved to the "max. r.p.m." position and the safety-gate pin must then be replaced.

Having tested the controls (including flaps) once more, I signalled "chocks away" and taxied out to the take-off position. I found that taxying required concentration, as the brakes on this particular machine, although effective, were inclined to be a little "snatchy." Prior to lining-up for take-off, I carried out the following cockpit drill: (1) trim tabs neutral; (2) throttle friction-nut adjusted; (3) airscrews to "max. r.p.m.," safety-gate pin in and friction-nut tight; (4) fuel and carburettor cocks on, balance cock off; (5) carburettor intake closed; (6) fuel contents checked; (7) flaps to take-off gate.

The take-off itself I found to be extremely simple. Both engines are opened up simultaneously to 2,800 r.p.m. and +6 lb boost, and if the control column is held in the central position the aircraft will theoretically fly itself off at about 65 kt. In practice, I found it preferable to get the nose down a little in order to counteract a tendency to become prematurely airborne. There was positively no inclination to swing either way. Climbing speed is 85 to 90 kt; the undercarriage may be raised once the safety speed (85 kt) has been reached and the flaps retracted when sufficient height has been gained.

The climb is made at about 2,600 r.p.m. and +3 lb, and the carburettor air intake, if closed, should be opened as soon as is convenient. For normal cruising, 2,350 r.p.m. and +2 lb is used (maximum weak mixture) and will give a reading of about 138 kt I.A.S. There seemed to be negligible change of trim on selecting undercarriage and flaps "up" and, in fact, throughout the whole range of manœuvres the trimmers needed only minor adjustment. Stick forces are small, and the aircraft is perfectly stable in all planes.

By comparison with landplanes of similar size—though such comparison is perhaps unfair—the ailerons, I felt, were a little "spongy"; nevertheless, they were not unpleasant. The elevator is sensitive and a tendency to over-control initially must be checked. I flew for a while in cloud, and found the necessary corrections easy to make with small control movements. At 4,000ft I attempted a clean stall. With the stick held well back there was a slight buffeting at 4 m.p.h. above the stall, which finally occurred at 68 kt. In the clean condition, stall characteristics were a bit ragged. Both wings dropped smartly one after the other, and I found it necessary to recover "one shoulder at a time." Unless the throttles are opened fairly quickly also, a lot of height could be lost. With full flap, however, the stall was gentle and straight, and recovery could be effected merely by a little forward pressure on the control column.

Describing a few languid circles over the Medway, we sought a good spot to alight and, having ascertained the wind direction from the wind-lines on the surface, I prepared to put down. Speed must be reduced to about 90 kt, and undercarriage positively checked by warning lights and visual reference in the "up" position. With take-off flap, the Sealand can be driven around happily at 90 kt while the final landing-path is being selected.

Once an alighting point has been chosen, full flap can be used (with little change of trim) and the aircraft driven down at a gentle rate of descent, maintaining at least 85 kt in the later stages

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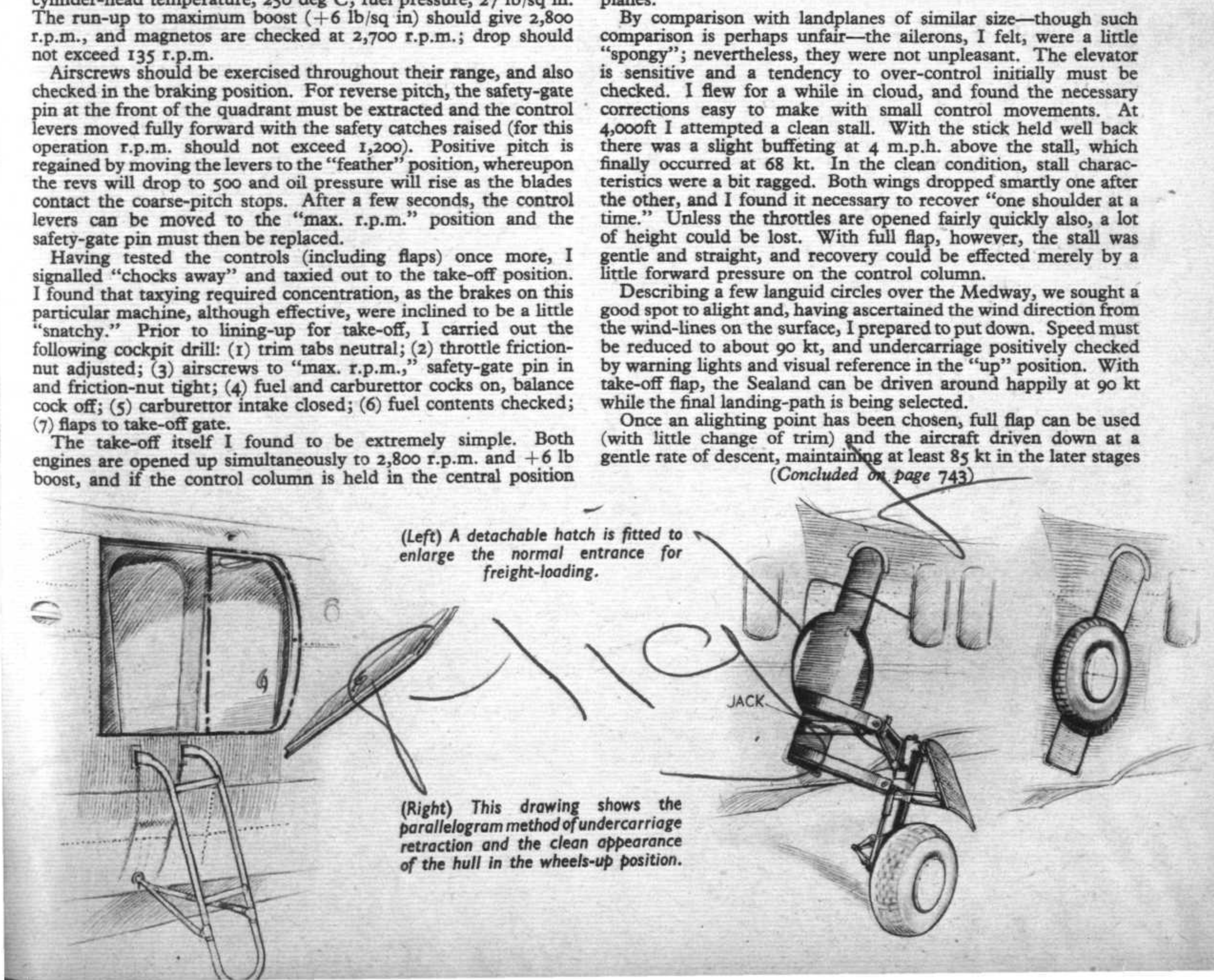

(Left) A detachable hatch is fitted to enlarge the normal entrance for freight-loading.

(Right) This drawing shows the parallelogram method of undercarriage retraction and the clean appearance of the hull in the wheels-up position.

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(Continued from page 735)

of the approach. A slight check is given at about 10ft to bring the nose up a little and, as the throttles are closed, the machine will touch lightly on its step at about 75 kt. The stick should be moved slowly back as the speed falls, and coarse aileron used up to the last minute to keep the floats out of the water. There is no tendency to pitch or yaw, and the Sealand decelerates rapidly. Flaps can be retracted once the speed has fallen away altogether, and, if required, the undercarriage may be dropped to give better directional control for taxying.

Taxying, it should be mentioned, is a sheer delight with the reversible airscrews. With one in reverse, the Sealand practically turns in its own length, while with both in that condition it will amble astern at quite an appreciable speed. In pitch-reversing, however, care must be taken to leave a little time in hand, as several seconds will elapse before the push or pull become effective in the required direction.

Mooring is very simple and may be carried out by the pilot alone, the hook stowed at his left side being used through the side hatch below his port window to pick up the moorings.

As with all marine aircraft, the water take-off is rather more tricky than the alighting. In the Sealand, the very reverse of accepted flying-boat technique has to be used, the control column being pushed right forward in the initial stages to prevent the nose from rising sharply and the starboard float from submerging. Take-off flap should be selected and the throttles opened up gently. There is no appreciable inclination to swing, and the bow-wave moves aft rapidly and leaves the pilot quite able to see where he is going (on some boats I have known, it blinds him for the first ten seconds or so). Coarse aileron and strong rudder movements may be necessary to keep the floats out of the water and the nose lined up on a pre-selected point on the horizon during the early take-off.

While the machine is moving up to the "hump" speed (the speed at which transition takes place from "buoyancy" to the planing position) some fairly strong elevator action may also be required to keep the nose down. Any tendency to porpoise once the "hump" speed is reached may be damped out by back pressure on the control column.

Elevator control during take-off is, on the whole, a rather tricky technique which it is as well to master completely before considering oneself a qualified Sealand pilot. While there are no inherent vices, in certain water and wind conditions it would be easy to get into trouble. When one is flying off glassy water, the lift spoiler is used up to 35 m.p.h. to keep the starboard float clear at high angles of attack. Once up on the front step, the aircraft accelerates quickly and flies itself gently off the water at around 70 kt. The maximum sea condition which the manufacturers recommend as allowable for the Sealand is 1½ft.

After several alightings and take-offs—for which the water conditions were excellent and my efforts, therefore, free from those jarring, passenger-worrying slaps which a hull has to endure in a choppy sea—I returned to Rochester for a landing on the grass. On reaching the airfield I must confess that I once again had the feeling that more length was needed, but soon found that I had nothing to worry about. Having already checked the rate of descent as being about 1,100 ft/min with power off, flaps down and undercarriage up, I did not contemplate much possibility of overshooting. With wheels and flaps lowered I found it best to make a steady approach at 90 kt, using just enough engine to achieve a smooth flare-out. "Over the hedge" speed can be reduced to about 85, and the check should be a gentle one, allowing the machine to trundle on its wheels with nose slightly raised at about 70 kt.

With the extra drag of floats, and its large frontal aspect, the Sealand loses speed quickly and pulls up in a surprisingly short distance. Care must be taken not to rely too much on brakes which have recently been subjected to water operations, for these will sometimes be found to be ineffective until properly dried out. The landing presents no difficulty, although an attempt to bring off a three-pointer in gusty conditions may end in a rather aggressive bounce.

All things considered, the Sealand is most definitely a pilot's aircraft and although, perhaps, it should not actually be recommended as the ideal type for inexperienced people, any reasonably intelligent pilot can quickly convert. The water-handling technique, the makers state, can normally be mastered in 10 to 15 hours. It is certainly safer and easier to fly than any comparable type on which I have had experience.

If I have any criticism it would merely concern minor points such as the fact that on this particular example the flap selector was not quite positive enough in finding its "gates," and that the control locking device was apt to jam.

Its docility is by no means the Sealand's sole virtue, for if the pilots like it, so too will operators who avail themselves of its exceptional versatility and economy of operation. Although the Sealand in its present form could do with a little more "urge," it is still, in fact, a very safe aircraft whose performance is quite adequate for the type of work for which it has been designed. There is also, of course, a pure flying-boat version in which the absence of an undercarriage permits an increase of 1,000 lb in payload.

SHORT SEALAND

Two D.H. Gipsy Queen 70-3, 345 h.h. for take-off

Wing span ...	61.5ft
Overall length (tail down)	42ft 7in
Height (tail down)	14ft
Aspect ratio	10
Wing loading	25.78 lb/sq ft
Power loading	13.38 lb/h.p.
Rudder area	45.16 sq ft
Gross weight	9,100 lb
Track	10ft 6in
Max beam ...	5ft 3in
Draught (at 9,100 lb)	2ft 6in
Max speed ...	161 kt at 5,000ft
Max w.m. cruising speed	147 kt at 8,000ft
Recommended cruising speed	110 kt
Stalling speed (power off)	59 kt
Climb to 10,000ft	12 min
Take-off to 50ft (I.C.A.N.) from water	1,020yd
Take-off to 50ft (I.C.A.N.) from land ...	750yd
Payload (4 pass., baggage, and 145 lb freight or mail)	893 lb
Range, with 5 passengers and baggage, at 110 m.p.h.	522 nautical miles

R.Ae.S. COUNCIL MEMBERS

AT the recent annual general meeting of the Royal Aeronautical Society, Major F. B. Halford, C.B.E., F.R.Ae.S., took office as president for 1951-52. Mr. Sydney Camm, C.B.E., F.R.Ae.S., and Mr. G. R. Edwards, M.B.E., B.Sc., F.R.Ae.S., were elected as vice-presidents, and a later announcement from the Society adds the name of Mr. G. H. Dowty, F.R.Ae.S.

The following were elected to fill vacancies on the Council: A.Cdre. F. R. Banks, C.B., O.B.E., F.R.Ae.S., Mr. E. B. Dove, A.F.R.Ae.S., Mr. G. H. Dowty, F.R.Ae.S., Dr. E. S. Moult, Ph.D., B.Sc., F.R.Ae.S., Mr. W. E. W. Petter, B.A., F.R.Ae.S., Mr. J. G. Roxburgh, Grad.R.Ae.S., and Mr. W. Tye, O.B.E., B.Sc., F.R.Ae.S.

ANNULAR NOZZLE VAPORIZER

THERE are cogent arguments for the employment, in gas-turbine combustion chambers, of vaporizing media instead of the rather more widely used atomizing nozzles, but one of the difficulties associated with vaporizing tubes is the provision of equable distribution of the fuel injected. It is to overcome this difficulty that a new form of vaporizer has been developed at A. V. Roe Canada, Ltd., by Mr. F. D. M. Williams.

In essence, Mr. Williams' development is simple. He has merely arranged that the outlet mouths of the cluster of "walking stick" vaporizer tubes discharge into a common annular nozzle. This nozzle is so constructed that the vaporized fuel is ejected in the form of a vortex directed upstream into the flame zone. It is claimed that the vortical nature of the flow induces an additional flow of air in the core of the vortex to give more complete combustion.

It is additionally claimed that the central nozzle not only provides for better mixing of the fuel before injection and better control over the pattern of flow in the combustion chamber, but that it also results in a stronger structure in that it provides unified support for the vaporizer tubes at their upstream ends. Further details of the vaporizer are available from Avro Canada, Malton, Ontario, or from Canadian Patents and Developments, Ltd., of Ottawa.

I.A.T.A. AND THE POLICE

ANOTHER aspect of the work of I.A.T.A. is seen in newly achieved process of co-operation with the International Criminal Police Commission. Through this measure it is intended to improve the safeguarding of international air shipments, help to prevent smuggling and simplify police formalities at international airports. As a result of conversations with the I.C.P.C., I.A.T.A. has now undertaken to determine the views of its member airlines on security and represent them to the police agency.

Explaining the Association's move, Sir William Hildred has pointed out that the negligible incidence of pilferage involving airline cargoes is already reflected in the low insurance rates on goods shipped by air. I.A.T.A intends to ensure that this will remain the case, not only by maintaining its own security services, but by following a policy of the closest co-operation with national and local police authorities.