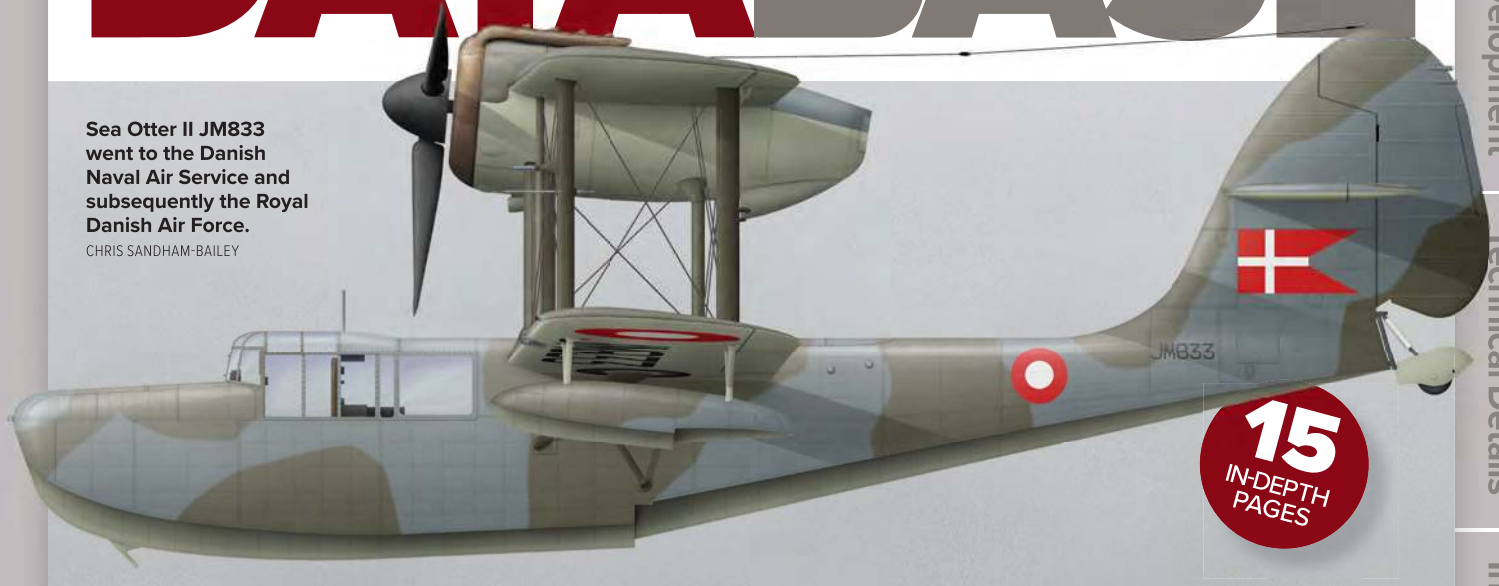
AEROPLANE

DATABASE

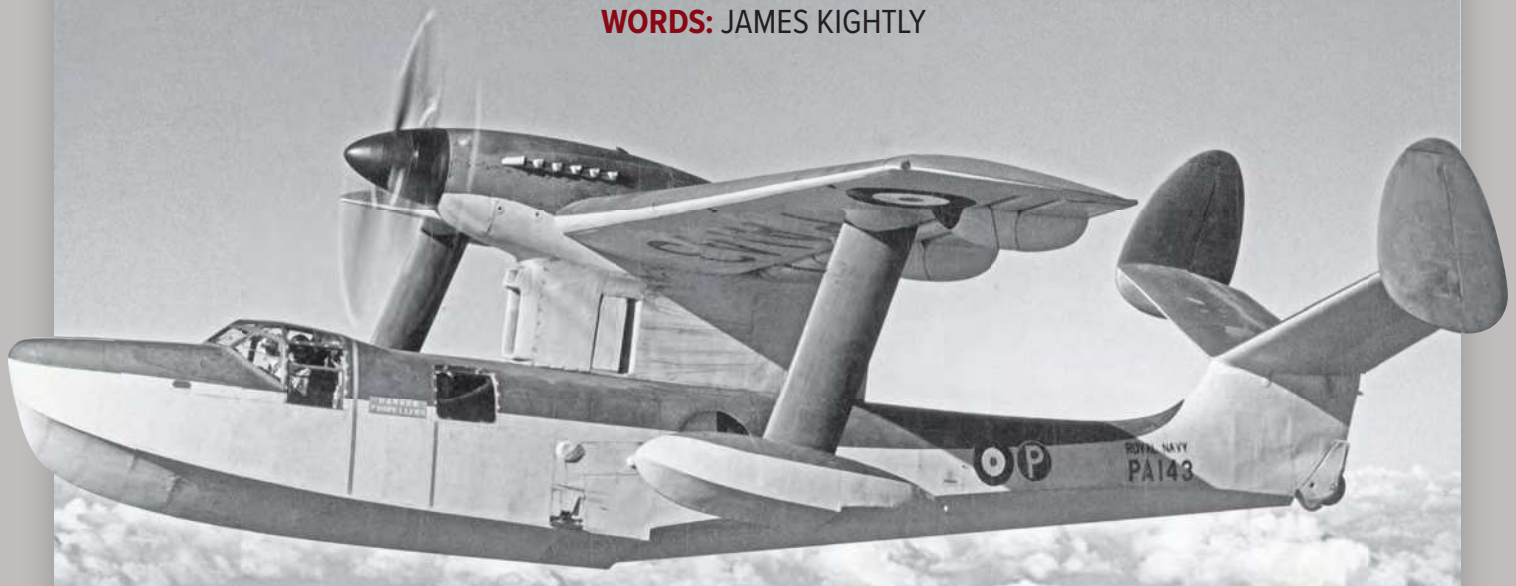


Sea Otter II JM833 went to the Danish Naval Air Service and subsequently the Royal Danish Air Force.
CHRIS SANDHAM-BAILEY

15 IN-DEPTH PAGES

SUPERMARINE SEA OTTER & SEAGULL

WORDS: JAMES KIGHTLY



A beautiful in-flight study of Seagull ASRI PA143, the first prototype example, being flown by Mike Lithgow. *AEROPLANE*

DEVELOPMENT

Gestation of Supermarine's last two marine aircraft designs

The first Sea Otter in the brief period when it was flown with the 'scissor' propeller arrangement, and with the rounded bow. JAMES KIGHTLY COLLECTION

The Sea Otter, while visually similar to the preceding Walrus, was an entirely new machine. At the end of the extensive range of Supermarine biplane amphibians, its origins stretched back to the Channel of 1920. It was also the last biplane to join the RAF inventory and, perhaps appropriately given his long run of marine aircraft, the Sea Otter became the final R. J. Mitchell design to enter service.

The genesis of the Sea Otter occurred even before the maiden test flight of the first production Walrus. Reginald J. Mitchell, Supermarine's chief designer and technical director, was already envisaging an improved Walrus powered by one of the promising new Bristol sleeve-valve engines, providing better performance in the same biplane amphibian configuration, with a tractor rather than a pusher engine arrangement.

After Mitchell met with the Air Ministry's director of technical development, the resulting requirement specified two prototypes, serials K8854 and K8855. The design was to be capable of operating from the carrier HMS *Furious*, be limited to a 46ft wingspan, and be equipped for both carrier and cruiser-based operation. It had to offer longer range, and even a dive-bombing capability. This was in addition to matching the existing standards achieved by the Walrus, such as stressing for catapult launching.

> ***"The Sea Otter was the last biplane to join the RAF inventory"***

The Supermarine report of 28 May 1936 defined the 'improved Walrus' as the Type 309, with a loaded weight of 8,500lb and a 796hp Bristol Perseus engine, matched to Air Ministry specification 5/36 following operational requirement OR33. It specified that the construction be akin to the Walrus, to similar dimensions as required for carrier and cruiser hangarage.

The appropriate performance needs were a cruise of 100kt (115mph) for 920 miles and a stalling speed below 48kt (55mph). However, due to the demands of developing Spitfire production, little priority was allocated to the new type, known at this stage as the Stingray.

The first tests of K8854 in September 1938 used a two-blade, fixed-pitch wooden propeller, as a conventional four-blade arrangement would have fouled the cruiser hangar ceiling. However, Supermarine's chief test pilot George Pickering was only able to get the Type 309 up onto the step in this configuration. Replacing it with a two-position, three-blade de Havilland propeller on 29 September was enough to get the amphibian off the water, but only after a 30-second run and with a sluggish climb. An innovative solution tried was a 'scissor' arrangement of two fixed-pitch wooden propellers set at 35° rather than the usual 90°. This finally enabled the aircraft, now officially named Sea Otter, to undertake successful flight trials. Pickering submitted the first formal report on its performance on 11 January 1939, the stalling speed being 54kt (62mph) and

the dive speed 155kt (178mph). This was followed in February by sea recovery trials conducted with HMS *Pegasus*, the former HMS *Ark Royal*, now a training and catapult testing ship.

At this point the Air Ministry required that the rounded bow of the prototype be reshaped broader at the top for better water spray suppression, while a Rotol Hydromatic three-blade, constant-speed propeller was fitted after catapult trials at the Royal Aircraft Establishment and before shipboard catapult tests on HMS *Pegasus* in July. Formal seaworthiness trials were undertaken on Southampton Water by Flt Lt Dennis in September 1939. Overall the design was found to be satisfactory, if not revolutionary, compared to the Walrus. This was when, as a result, the first ideas for a major capability improvement — which became the monoplane Seagull — were explored at Supermarine. Despite the lack of significant design changes, specifications S7/38 and S14/39 were also issued for the Sea Otter iterations.

In January 1940 Supermarine was instructed that the Sea Otter was to go into production. It made efforts to reduce the landing speed, initially by trialling longer-span 50ft wings originally intended for the uncompleted second prototype, K8855. But for production, the original 45ft-span wings were equipped with flaps on the upper planes instead. K8855 was recorded as lost in the September 1940 Luftwaffe bombing of the Southampton works which also destroyed the prototype B12/36, the 'Supermarine bomber', R. J. Mitchell's final design.

As with the Walrus, Supermarine was too busy to build the Sea Otter. Order I/P2 placed with Blackburn for 190 Perseus-powered examples in the BL and BT serial sequences was cancelled, as it too was overstretched, so production of the last Supermarine biplane amphibian was placed with fellow marine aircraft experts Saunders-Roe in January 1942, with an initial contract for 250 examples. Saro's Isle of Wight factory was selected for Walrus and then Sea Otter manufacturing, in part to avoid having higher-value factory targets within close range of German bombers. Some Sea Otters were also built at Weybridge.

TOP: A good view of the 'scissor' propeller arrangement on Sea Otter K8854, which proved necessary to fit within the height requirement and to part company properly from the water. KEY COLLECTION
ABOVE: Sea Otter ABRI JM739 marked for testing with the prototype 'P'. CROWN COPYRIGHT

The main change between the prototype and production Sea Otters was the substitution of the sleeve-valve Perseus engine with the Bristol Mercury XXX of 965hp. This configuration had been tested on the prototype in May 1941 using a Mercury XX of 920hp, and solved cooling problems with the Perseus.

The first production Sea Otter, JM738, was test-flown by Jeffrey Quill from Somerton, Cowes in January 1943, a year after the production order had been placed and more than three years after the prototype's first flight. It underwent trials from land at Worthy Down and Southampton Water initially, and then with the Marine Aircraft Experimental Establishment at Helensburgh, Dunbartonshire. Testing was expanded with a second example, JM739, in April 1943. It underwent catapult trials at an overload weight of 10,250lb at Farnborough and from HMS *Pegasus*.

On 21 May, during an overload take-off into a swell, JM739 porpoised, leaving the water twice and landing heavily. On inspection, the engine mounting was found to be damaged, which delayed the remaining tests. Once they resumed, it was confirmed that the water rudder was inadequate for directional control even in low crosswinds and that water spray from the bow obscured the windscreen less than on the Walrus. The report noted that "serious damage could result" on alighting in an overload condition, so a fuel jettison system should be incorporated. Much later, in June 1945 JM738 was tested with an enlarged, retractable water rudder, which was found satisfactory.

The first production batch was given the ABR MkI designation, for Amphibian Boat Reconnaissance. From the eighth batch, starting with JN249, this changed to ASR MkII for air-sea rescue, the aircraft lacking the now-redundant armament and other equipment. Both versions used the Bristol Mercury XXX.

Production comprised 250 machines with serials JM738-JN257, and 40 as RD869-RD998. Of the total 292 including the prototypes, 241 went to the

RAF, reflecting the change in role from spotting to rescue. Sea Otter production ended with the delivery of RD922 on 13 July 1946. An order from Saro in the VF350 serial series was cancelled due to the war's end cutting short the proposed 592-example production run.

The Aeroplane and Armament Experimental Establishment at Boscombe Down tested RD876 with an arrester hook in June 1946, to enable the type to land aboard the smaller escort carriers under all conditions. The first production example fully equipped for deck landings was RD920, a MkII. The rudder was reshaped; the upper area increased to allow the lower part to be cut away. The 'hooked' Sea Otter was passed for deck landing, albeit without the use of flaps. Sea Otters expected to operate on open water with ships had a 'barb'-style towed net recovery hook on the keel to use the US Navy mat recovery system.

Overload take-offs with RATOG (rocket-assisted take-off gear) were trialled in 1947 and found suitable, but the practice was never adopted. The underwing carriage of Type G air-sea rescue equipment was tested as late as July 1951.

Seagull

The Seagull ASRI was the final Supermarine marine aircraft, but it never saw service because the development of effective helicopters.

As early as 1940 Supermarine was considering a much-improved version of the Walrus and Sea Otter, in response to 1940's specification S12/40 issued by the Air Ministry for a naval catapult-launched observation/spotting flying boat. In October 1940 a brochure featuring biplane and monoplane options, with either the Rolls-Royce Merlin 30 or the Bristol Taurus, was submitted to the ministry and discussed at a design conference in April 1941. Fairey was also invited to submit, but chose not to.

At this stage the Type 347 design was to have a four-gun Frazer Nash turret at the top rear of an engine trunk, and the amphibian was to fit within

TOP: Supermarine's dumpy Type 322 proved the variable-incidence wing concept. KEY COLLECTION
ABOVE: The new Seagull was, in many ways, a radical and innovative design. KEY COLLECTION

carrier lifts and carrier hangars. This was a major challenge, requiring a significantly higher-performance type to be fitted with more equipment and systems in essentially the same space as the earlier biplane designs. Supermarine's proposed biplane configuration would have more lift within these constraints, but limit top speed and range, while the monoplane option would need something extra to achieve the low-speed and high-lift requirements.

The solution lay with an earlier project's innovation. Supermarine had developed a Type 322 to naval specification S24/37, which was, incidentally, fulfilled by the Fairey Barracuda. The Type 322s, R1810 and R1915, employed a variable-incidence wing, allowing incidence to be increased to a remarkable 13°. This secured control at significantly lower speeds, and the pilot maintained clear visibility over the nose. High-lift flaps and slats lowered the controllable flying speed further, and when climbing away, with the incidence reduced and the flaps and slats retracted, very little drag remained. The wing also folded, as intended for a carrier aircraft, and brought a relatively small weight penalty. While the two prototype 322s (nicknamed 'Dumbo') did not enter service, they were in testing from early 1943 and provided significant data, proving the concept.

In November 1944 R1810 was delivered to the Royal Aircraft Establishment where further testing of the wing was carried out, along with related tests on a 1/16th-scale Type 347 amphibian model. This wing, and Supermarine's knowledge gained from 'Dumbo', made the monoplane Type 347 viable. The design was not developed with any great urgency: the Walrus was providing satisfactory service in a shipboard role that was rapidly becoming obsolete, but the specialised task of air-sea rescue was emerging.

> ***"The Seagull design was not developed with any great urgency"***

Supermarine received instructions from the Air Ministry to proceed with the Type 347 on 9 April 1943, for three prototypes, serials PA143, PA147 and PA152. With lobbying from Supermarine, led by the type's creator Joseph Smith — appointed as company chief designer in 1941 — the Admiralty accepted the aircraft need not fit below-deck storage on the earlier carriers with their smaller lift and hangar. This eased the stringency on overall span, folded width, height and weight which threatened the design's success.

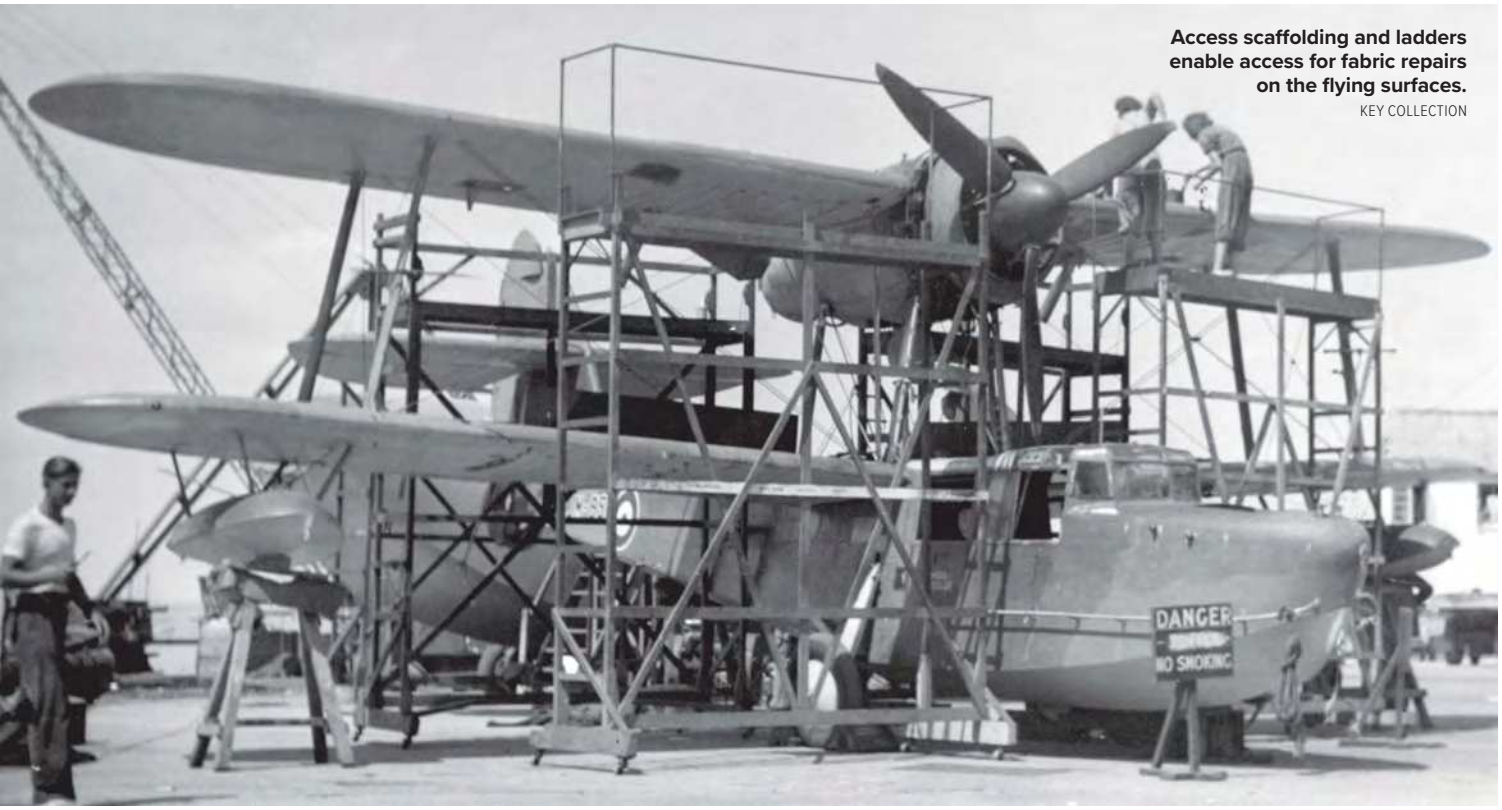
The specified engine was upgraded to the Rolls-Royce Griffon VI of 1,720hp, confirmed on 27 November 1944 in new specification S14/44, and the role became "air sea rescue and reconnaissance flying boat". The turret requirement was removed. The three prototypes were constructed at Hursley Park, and the wings built at Castle Road, Salisbury. Empennages were made by Folland Aircraft at Hamble, though PA152 was never finished.

Taking advantage of the leisurely build programme, extensive wind tunnel tests at the RAE in May 1944 explored options for the tail configuration, which was required to remain above the water and spray, and to avoid new airflow blanking issues from the wing and flap arrangement. The chosen configuration proved effective in these respects. Other options had been a butterfly tail with no endplates, or a T-tail.

Matching an appropriate Griffon engine to a propeller required input from Rolls-Royce, which modified the front casing and reduction gear, and propeller manufacturer Rotol, resulting in a 10ft-diameter counter-rotating propeller with six duralumin blades. This also brought the incidental advantage of negating any engine-induced yaw.

TECHNICAL DETAILS

Two designs separated by just a short time, but which were radically different



Access scaffolding and ladders enable access for fabric repairs on the flying surfaces. KEY COLLECTION

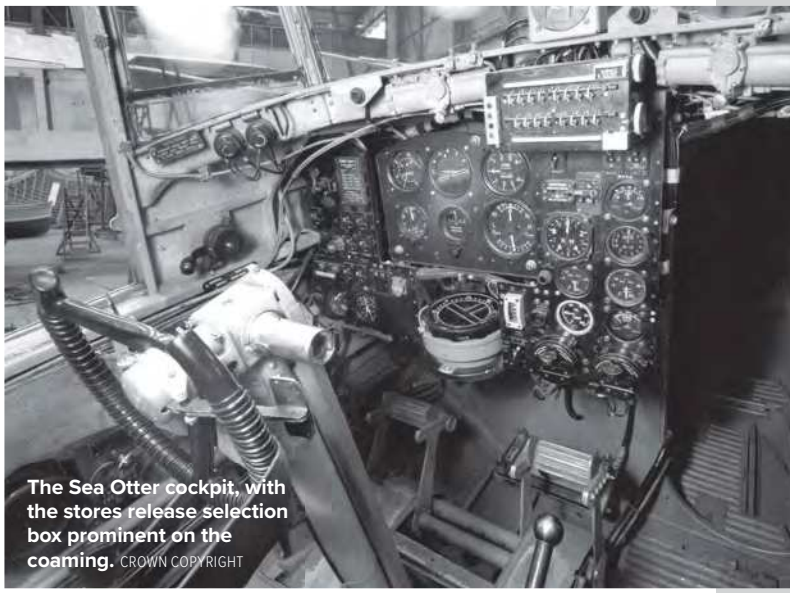
The Sea Otter followed the Walrus design, as required in the specification, with a semi-monocoque hull and fin structure, the fin incorporating an aerofoil section to counter the engine's torque. The underside was a single-step planing hull. The fuselage had a bow hatch, with a fully glazed cockpit behind it, with a slightly raised roof, direct vision panels and side windows that could be opened. The side windows extended past the navigator's position behind the pilot (both seated on the port side) and a midships hatch. Both hatches were fully faired in and more streamlined than those on the Walrus. An emergency hatch was situated in the cockpit roof. The fuselage was fitted with four catapult spools. Grab rails around the lower hull were usually installed, and on camouflaged Sea Otters they were painted yellow.

The wings and horizontal tail were all-metal structures with stainless steel rolled 'figure-8' spars, and fabric covering. All four wings had ailerons, with aerodynamic flaps on the upper wing centre section. To enable the wing cellules to fold aft alongside the fuselage, flap-size moveable panels on the lower wing, and small triangular panels on the upper, folded to provide clearance. Two fuel tanks of 104-gallon capacity each were carried in the upper wings, and later Sea Otters featured large fuel tank vent pipes. The wing struts were, unusually, angled inward at the top. The lower wing had floats attached below, of a flatter cross-section than on the Walrus, with a 'button' to lock them to the rear fuselage to hold the wing cellules when folded. The empennage was of a cantilever configuration, without strut bracing. Trim flaps, controllable in flight, were provided on the rudder and elevators.

The engine nacelle was also semi-monocoque and all-metal. An oil cooler intake was positioned ventrally and exhausted through the rear. The 15.5-gallon oil tank

DATAFILE SPECIFICATIONS: SEA OTTER

POWERPLANT	
One Bristol Mercury XXX nine-cylinder air-cooled radial, 965hp	
DIMENSIONS	
Length:	39ft 10.75in (12.2m)
Span:	46ft 0in (14m)
Width folded:	18ft 0in (5.49m)
Height (on ground):	15ft 1.5in (4.61m)
Wing area:	610 sq ft (56.7 sq m)
WEIGHTS	
Empty:	6,805lb (3,086kg)
Loaded:	10,000lb (4,536kg)
PERFORMANCE	
Top speed:	163mph (262km/h)
Cruise speed:	100mph (161km/h)
Range:	690 miles (1,110km); with overload tank, 920 miles (1,480km)
Service ceiling:	17,000ft (5,181m)



The Sea Otter cockpit, with the stores release selection box prominent on the coaming. CROWN COPYRIGHT

was mounted in the port side. Hatches above and below gave a crew member access above the engine, in position to receive the Thomas grab from a shipboard crane which enabled hoisting-aboard, and for engine servicing. The Mercury XXX engine, fitted with a three-blade Rotol Hydromatic constant-speed propeller, was close-cowled and exhausted via a flame-damper exhaust offset above the wing. The carburettor air intake was below the cowling.

A retractable tailwheel undercarriage had mainwheels that retracted into the lower wings and a tailwheel (initially a twin wheel, later a Linatex rubber type) embedded in a water rudder. A hand-pump hydraulic system raised or lowered the undercarriage, with mechanical up-locks and down-locks, and a warning horn. Later the water rudder was enlarged and made retractable as a unit, maintaining the tailwheel ground angle.

Crew positions were for a pilot, navigator and wireless operator, with alternative positions for nose and midship gunners. A second pilot's position was available with the seat normally stowed on the cockpit starboard side, though the dual controls were rarely carried. A 60-gallon auxiliary tank formed the navigator's seat.

The aircraft employed a 24-volt electrical system, and a pneumatic engine-driven system powered the wheel brakes and flaps. Armament included forward and midships gun positions, but these were rarely carried in service. Demountable stores racks could be fitted to the lower wings. An ASV (air-to-surface vessel) radar with a compact Yagi antenna on the forward outer struts was standard. Air-sea rescue operations saw the addition of extra survivor rescue equipment. The normal marine aircraft equipment of mooring gear, boat-hook, inflatable dinghy, anchor, drogues and sea anchor were carried.

Seagull

The Seagull ASRI had an Alclad semi-monocoque flush-riveted fuselage with a single-step planing bottom, constructed with two longerons and two chines and closely spaced alloy frames. The wing was mounted on a long, narrow, centre fuselage-mounted pylon. An up-swept, thinned rear fuselage acted as the support for the empennage 'Y' arrangement. There was a hatch in the bow, with retractable mooring bollards, a fully glazed cockpit, and another hatch on the rear fuselage, plus large emergency exit windows in the fuselage and smaller windows aft of the pylon.

The Rolls-Royce Griffon engine was fitted with a Coffman cartridge starter, and was mounted above the front of the pylon, with the radiator arranged vertically beneath it, exhausting to the sides of the pylon. Above the nacelle was a single, retractable slinging eye hoist point, accessed from the hull by a hatch aft. The pylon contained the eight-gallon oil tank and the Graviner fire extinguisher system, plus a demountable derrick to assist loading through the aft hatch.

A hydraulically actuated tricycle undercarriage was capable of accepting a 13ft per second vertical load, with main Vickers oleo legs and Dunlop wheels and brakes which folded into the fuselage sides. These could be removed to increase payload when operating purely as a flying boat. The tailwheel was embedded in a retractable water rudder, stored flush with the bottom rear fuselage. Other equipment included a fully retractable 'sting'-type arrester hook, JATO points and catapult spools. The pilot's position was on the port side, with the navigator seated directly behind. Demountable dual controls and a co-pilot's position were available.

The radically designed wing was mounted on the pylon. The entire wing was pivoted on the front spar root joints with phosphor-bronze bearings, with two incidence-changing screw jacks actuating the movement on the rear spar using a 1.5hp electric motor. This was powered, along with the other lift devices, by alternating current from an engine-driven alternator of 8.5kVA, controlled by a cockpit switch from 2° incidence to a maximum of 12.5°, with a manual back-up in the pylon. The wing boasted large, full-length leading-edge slats, and slotted flaps covering 40 per cent chord, including inset ailerons which also drooped for low-speed flight, effectively forming a double slot. These ran on eight sets of tracks. Due to the torque-cancelling effect of the contra-rotating propeller, no aileron or rudder trim tabs were added. A (manual) rotating wing fold with skewed hinges at one-third span positioned the wings parallel to the fuselage, top-outward. The second prototype had hydraulic folding. Six fuel tanks were carried in the wings, with a total capacity of 285 gallons. Two drop tanks were planned, of 60 gallons each, but never fitted. Wing hardpoints allowed the carriage of stores. The wingtips were wooden, for the proposed addition of the Rebecca IV ASV radar. Light alloy semi-monocoque wing floats hung on single streamlined pylons below the wings, and had an extending rod to lock the folded wings to the fuselage.

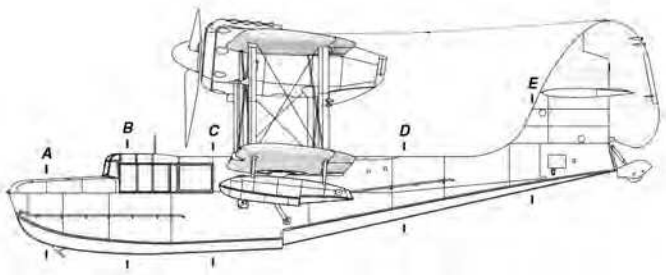
The empennage consisted of a 20° dihedral butterfly tail with endplate fins and rudders at 90° to the 'horizontal' tail. A centre fin and rudder was added during development.

DATAFILE SPECIFICATIONS: SEAGULL ASR

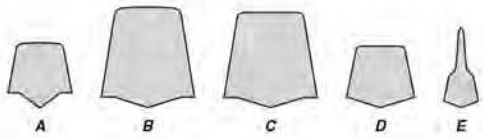
POWERPLANT	
One Rolls-Royce Griffon 57 with water/methanol injection, 1,185hp	
DIMENSIONS	
Length:	44ft 1.5in (13.45m)
Span:	52ft 6in (16m)
Width (wings folded):	23ft 6in (7.17m)
Height (tail down):	15ft 10.5in (4.84m)
Wing area:	432 sq ft (40.13 sq m)
WEIGHTS	
Empty:	10,510lb (4,767kg)
Loaded:	14,500lb (6,577kg)
PERFORMANCE	
Top speed:	260mph (418km/h)
Cruise speed:	131mph (211km/h)
Range:	875 miles (1,408km); with drop tanks, estimated 1,230 miles (1,980km)
Service ceiling:	23,700ft (7,224m)

Note: estimated data for proposed production Seagull ASRI

Seagull PA143 during its Farnborough debut in 1948. KEY COLLECTION



SEA OTTER I



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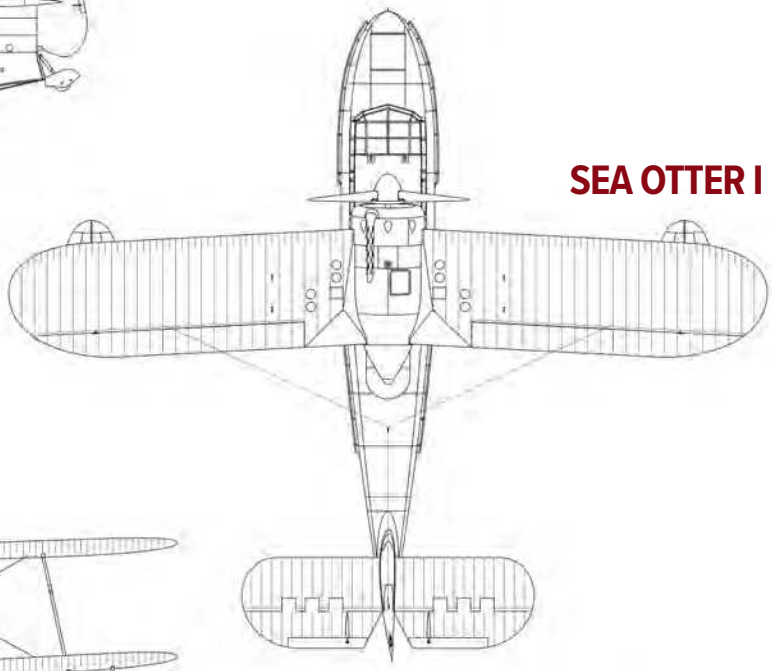

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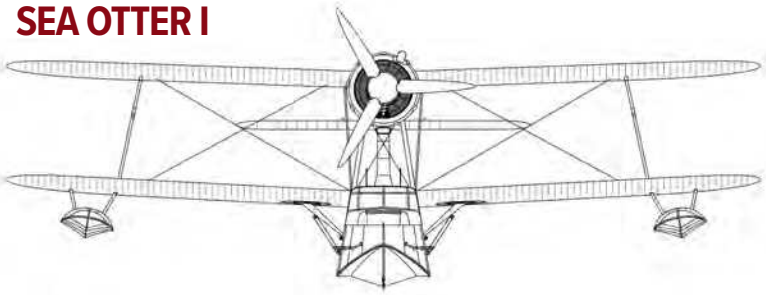
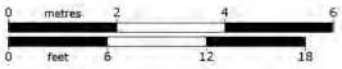
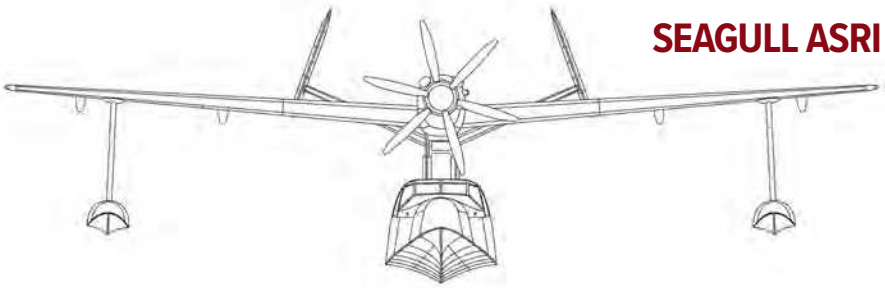
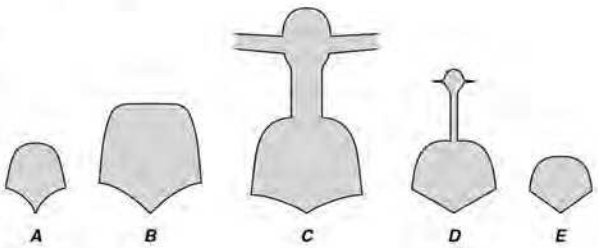




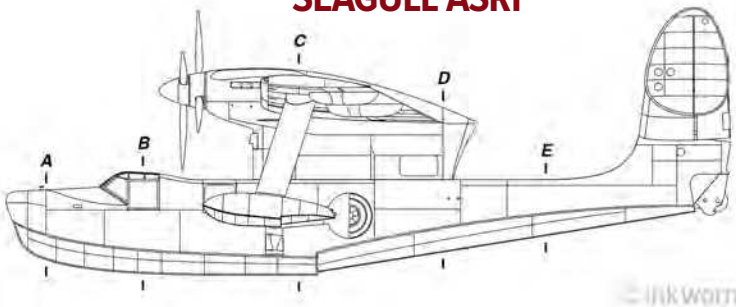
SEAGULL ASRI



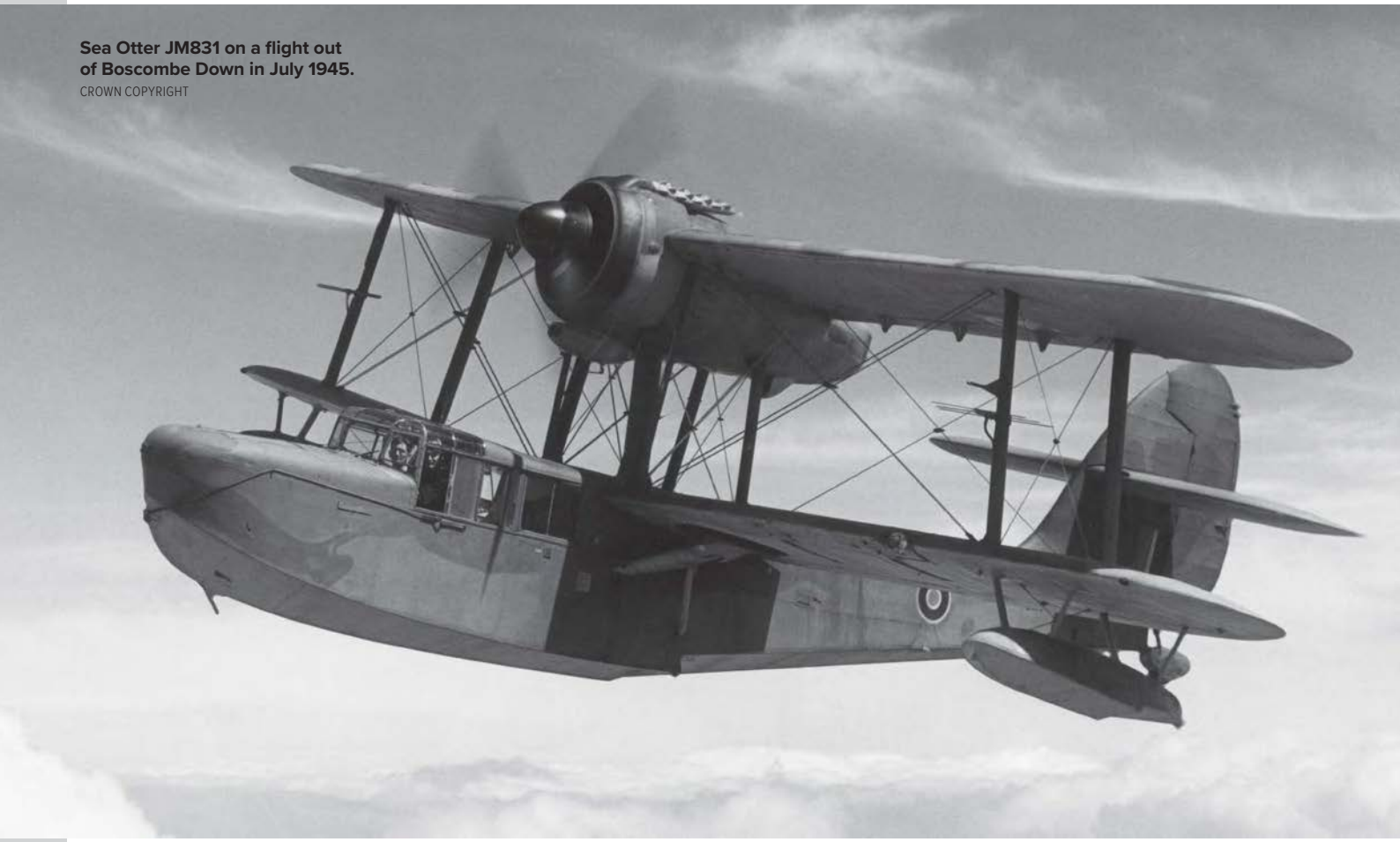


SEAGULL ASRI

SEAGULL ASRI



While the Sea Otter flew in both war and peacetime, the Seagull ASR never reached service



Sea Otter JM831 on a flight out of Boscombe Down in July 1945.
CROWN COPYRIGHT

RAF

Although the intention was to replace all Walruses with Sea Otters in the amphibious rescue flights, this was delayed by the slow installation of rescue equipment in the new type, and the war ended before full re-equipment.

Sea Otters served with the RAF in Nos 276, 278, 281, 282 and 292 Squadrons, mostly arriving some time after mid-1944, and in the Far East with Nos 1350, 1351 and 1352 Flights. A census in April 1949 revealed 30 examples at British stations, seven at sea and 48 under repair or stored, the majority with Nos 18 and 19 Groups for air-sea rescue and with the Royal Navy. Others were overseas.

The entry to service of a new type had its challenges. One of the first Sea Otter pick-ups was by Plt Off A. K. 'Kiwi' Saunders of No 277 Squadron in JM770 on 5 March 1944. He was assigned to pick up six survivors from a US Army Air Forces B-24, belonging to the 446th Bomb Group's 704th Bomb Squadron, 25 miles out from Bognor. The serious injuries — three of the Americans had broken limbs as well as facial injuries — meant Plt Off Len Healey had to climb into the Liberator crew's dinghy after the Sea Otter's engine had been stopped, not normal practice at sea, and help lift each man to Flt Sgt F. S. Green in the narrow hatch. Healey recorded, "We decided to get two of the chaps who were fitter in with us, so they could help lift the three injured into the back hatch. This took some doing as the hatch was only two feet wide, and with two people trying to pull a third one in, that was almost impossible."

> *"The Sea Otter could get off the water in conditions the Walrus couldn't"*

Among the RAF units with which Sea Otter JM815 served was No 201 Squadron.
KEY COLLECTION

Soon after, on 16 March, Plt Off Peter Weeden of No 277 Squadron joined Sqn Ldr Brown of No 278 Squadron as a scratch crew to pick up three Americans in the water 20 miles south of Dungeness, flying Sea Otter JM745. It had just come out of overhaul and was the only option available, all other Walruses being out already. Unable to heave-to by the men, Brown stopped the engine and Weeden dived overboard to bring them to the Sea Otter. "By ducking under them and pulling up on the rail, with Brownie pulling from the rear hatch, we managed somehow to get them all aboard", wrote Weeden.

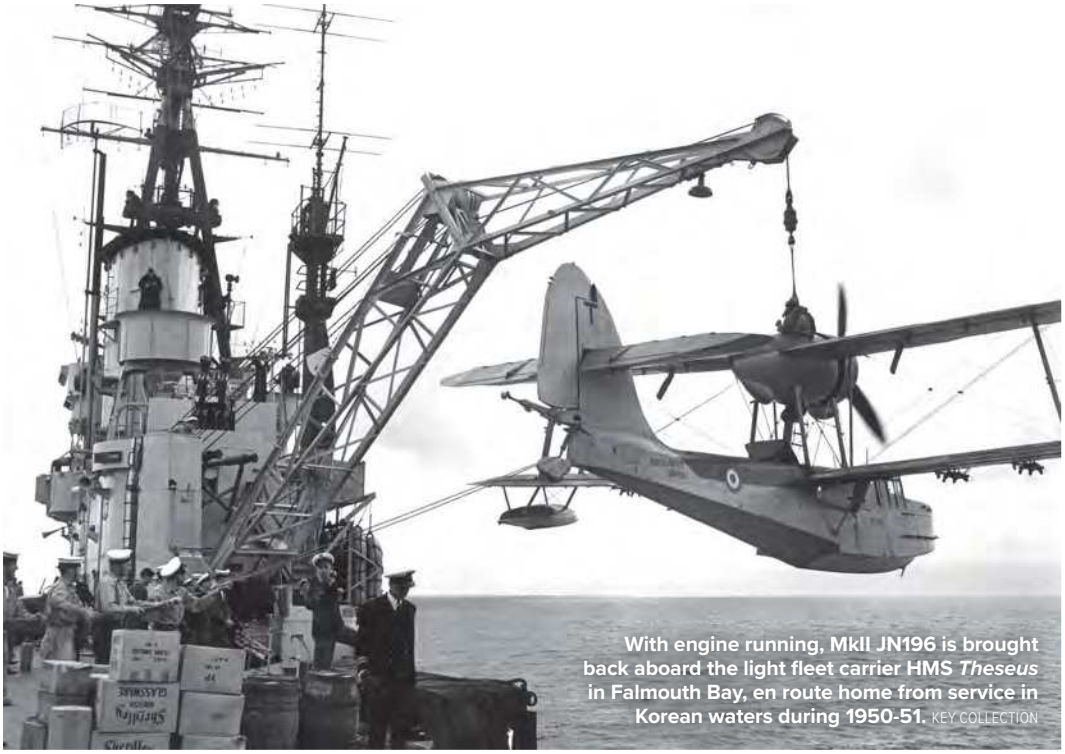
While no rescues were 'routine', some were exceptional. On 16 March, Plt Offs T. Fletcher and Len Healey, after picking up a Spitfire pilot while under fire within a mile of the French coast, were sent out again in Sea Otter JM796, this time joined by Plt Off Bill Gregory. They were to assist a wooden-hulled Walrus II that was unable to get off the water

after picking up five Americans from a B-17 crew. After alighting, the Walrus' pilot put them into a dinghy and transferred them to the Sea Otter. Healey slashed the dinghy and the Sea Otter was able to take off, but the Walrus could still not get airborne until advised by Fletcher and the use of a smoke float to manage the wind direction.

This well illustrated the advantages of the new Sea Otter. The wooden Walrus was both heavier than the MkI metal-hulled example, and suffered from water soak during use, though it was quieter and better-handling. Despite the Sea Otter being significantly heavier (6,805lb against the Walrus' 4,900lb unloaded) and a couple of feet longer, it was able to lift more and get off the water in conditions the Walruses couldn't.

It could get worse, still. On 4 July 1944, Sea Otter JM776 flown by Flt Lt C. G. Robinson and crewed by WO E. C. Quick and RAF photographer Plt Off E. W. Coop picked up Plt Off G. T. Emery, but would not get off the water due to the extreme sea state and the engine failing to achieve full power. Unable to taxi towards Newhaven directly, their rescue was transferred to high-speed launch 190 and a tow taken from it, but the waves were forcing water through the closed windows and hatches. Once in the lee of Beachy Head, the starboard wing was dangerously low as it filled with sea water, so Eddie Quick crawled out onto the port wing to put some weight on the other side and keep the starboard wing out of the sea. Quick was relieved from hanging onto the wing struts after half an hour by Coop, the two men switching every half-hour from just after midnight until 05.00hrs. Worse, the hand-pump had failed, so the crewman not on the wing had to bail the bilges with a soup tin continuously from 19.00 to 03.00hrs. Thanks to their exhausting work, they were able eventually to restart the engine and make harbour, saving the Sea Otter and themselves.

RAF air-sea rescue units also active in the Far East too, sustaining casualties. Sea Otter JM882 of No 292 Squadron was lost on 9 January 1945, shot down in flames near Akyab, Burma in a major running battle with six Nakajima Ki-43 'Oscars', Maj Toyoki Eta and his wingman from the 64th Sentai dealing the fatal blow. They in turn were tackled by five Spitfires from No 67 Squadron, with over-claims by fighter pilots on both sides. New Zealander Sea Otter crewman WO John Horan was killed.



With engine running, MkII JN196 is brought back aboard the light fleet carrier HMS *Theseus* in Falmouth Bay, en route home from service in Korean waters during 1950-51. KEY COLLECTION

Routine operations always carried risks. On 14 April 1946 an RAF communications flight Sea Otter, JM766, went missing en route from Seletar, Singapore to Batavia. The crew — Plt Offs Broughton, Holden and Hall, and WO Johnson — were found by a Royal Netherlands Navy Catalina from 321 Squadron after being spotted on Noordwachter Island (now Pulau Sebira) off Java. They had been forced to ditch and the aircraft broke up on the rocks.

Royal Navy

Sea Otters were initially allocated to 1700 Squadron at Lee-on-Solent in November 1944, then to 1701 and 1702 in February

The Sea Otter's carrier-borne service presaged the introduction of more practical helicopters. KEY COLLECTION

MkIIs of 781 Squadron — JN202, JN180 and RD916 — at Lee-on-Solent. KEY COLLECTION

and June 1945 respectively. They headed to the Pacific for anti-shipping sweeps, and mine-spotting with HMS *Ameer* and *Emperor* off Phuket Island. 1703 Squadron was disbanded in September 1945 at Lee-on-Solent a month after formation due to the war's end, while 1702 never left the UK. 1700's Sea Otters were at Trincomalee in August 1945, while 1701 spent time at Manus and Hong Kong, and provided air-sea rescue facilities for the Mobile Naval Air Bases (MONABs) with 'A' Flight at MONAB VI, HMS *Nabstock* located at RAAF Maryborough, Queensland, Australia, and 'B' Flight at Ponam in the Admiralty Islands as part of MONAB IV.

Post-war, single Sea Otters served with many navy squadrons, both for rescue and communications work. For example, HMS *Glory*'s machine made mail runs flying from Golfe-Juan in the south of France during the Combined Home and Mediterranean Fleet Exercise in March 1950. 799 Squadron's 'C' Flight had operated a Sea Otter conversion and refresher course in late 1945.

Korea showed that 'hot' wars still occurred. HMS *Triumph*'s Sea Otter, JM960 *Neptune's Daughter*, earned its keep. It rescued a ditched US Navy Corsair pilot in rough seas off Wonsan on 19 July 1950, as recorded by Tony O'Toole: "The Sea Otter, flown by Lt Cdr P. Cane and his crewman Chief Petty Officer Aircrewman G. O'Nion carried out a long range search to find and retrieve him but whilst landing on the rough sea it suffered a damaged float and at one time almost resembled a crash diving submarine due to the size of the waves. Nevertheless, they got the American pilot aboard and managed to take off again, earning Lt Cdr P. Cane a well-deserved American Air Medal and Chief Petty Officer Aircrewman G. O'Nion received a mention in despatches."

Earlier, *Triumph*'s Sea Otter had picked up No 77 Squadron, RAAF Mustang pilot W. B. Rivers in the Inland Sea south of Hiroshima, Japan on 17 April 1950. His mount, A68-722, had collided with one a Fairey Firefly from *Triumph*, PP434, during a practice interception. The Firefly's pilot was recovered by a Japanese fishing boat; the observer was killed.

Ultimately, Sea Otters were replaced by pioneering service helicopters. Before that, JM909 demonstrated the air-sea rescue role in the 1954 Eros film *The Sea Shall Not Have Them*. Confusingly, the studio interior shots are of a Walrus cockpit. Two Sea Otter fuselages were among the airframes used by Halton apprentices in the 1950s, where a trainee recalled, "a fiendish instructor who would smash a hole in the fuselage with a hammer and chisel for us to practice waterproof metal repairs."

Australia

The Royal Australian Navy acquired three Sea Otters in 1948 for carrier-borne air-sea rescue, operated by No 723 Squadron from 1948-53 as part of the establishment of Australia's first full naval carrier force. They were embarked in HMAS *Sydney* and Vengeance, and shore-based at HMAS *Albatross*, Nowra, New South Wales. They were replaced by Westland Sycamore helicopters in 1953. RD914 was sold and scrapped; RD917 was returned to the Royal Navy aboard HMAS *Sydney*, and JN200 passed into civilian hands.

Ex-Royal Australian Navy example JN200 nearly made it into preservation but was scrapped. The nose is in the Nowra naval aviation museum.

Denmark

The Danish Naval Air Service received the first of eight Sea Otters, refurbished examples from No 15 Maintenance Unit at Wroughton, Wiltshire, and the majority ex-No 281 Squadron, RAF. The first four arrived by air at Kastrup on 19 December 1946, as part of the 1. Luftflotille (1st Naval Air Flotilla) at Naval Air Station Copenhagen. In order of initial delivery, the fleet comprised JM807, JM809, JM975, JM980, JM833, JM958 and JM878. Of those, JM807 was damaged in a hard landing at Øresund on 12 January 1947 and cannibalised. JM943 was delivered in May 1948 for spares. Given Danish serials 801-806, the remaining aircraft served on search and rescue duties as well as training, and were taken on by the newly formed Flyvevåbnet (Royal Danish Air Force) in 1950, serving then with Eskadrille 721. Three were scrapped the following year. The last three served until scrapping in March 1952.

Egypt

Eight Sea Otters were registered G-AKPN to 'PV (JN139, JN114, JM989, JN197, JN187, JN138, JN137 and JN194 respectively) in late 1947, after which they were sold by J. Patent to the Royal Egyptian Air Force in February 1949. They were allocated to No 4 (General Reconnaissance) Squadron based at Dekheila, Alexandria. Apparently they were of limited utility, as in the 1949 order of battle there is no mention of Sea Otters, while in 1952 five are noted, but all unserviceable with No 4 (Navigational) Squadron.

France

Escadrille 8S of the French Aéronautique Navale was formed after the Japanese surrender in the former colony of French Indochina, using a mix of available types including 10 captured Aichi E13A1 'Jake' floatplanes, a single Loire 130 and one Nakajima A6M2-N 'Rufe'. They were based at Cát Lái, a riverfront area of Saigon (now Ho Chi Minh City, Vietnam). There were serviceability issues, and as French colonial forces were unable to use US equipment at this stage due to American resistance, 11 Sea Otters — including a spare — were acquired from British surplus stocks in Ceylon.

Coded 8S-5, this is one of the Sea Otters flown in Indochina by French Aéronavale unit Escadrille 8S.

The first post-refurbishment evaluation flights were carried out at HMS *Bambara*, Trincomalee on 28-29 June 1947 by pilot Lt de Vaisseau Faure and his crew. Six Sea Otters were transported from Trincomalee to Saigon aboard the tanker *Mekong* in two voyages, and the remainder in crates aboard the aviation tender *Robert Giraud*. They were allocated to the Troupes Coloniales (the French colonial army) and used for insurgent control against escalating guerrilla operations by the Communist Viet Minh, which involved reconnaissance, support missions, and the protection of river convoys on the Mekong Delta and in the Gulf of Siam. Harking back to the original type specification, they carried out artillery fire-spotting, as well as medical evacuation and supply-dropping.

> ***"They saw what we could not see from our positions in the jungle"***

For maritime and river surveillance, regular armament included the bow and midship machine guns, four anti-submarine depth charges or four bombs of 100lb, or four 500lb bombs when on bombing raids. Four passengers could be taken on communications flights, while up to two stretcher cases and one seated were accommodated on medical evacuations. From Cát Lái, the aircraft were operated up-country from the aviation tenders *Robert Giraud* and *Paul Goffeny*, each fitted with deck cradles for a single Sea Otter.

Natural attrition in this demanding theatre, as well as remarkably frequent damage from Viet Minh ground fire, degraded Escadrille 8S's capability. On 28 February 1949, Sea Otter 8S-4 was destroyed in the Gulf of Siam, while on 9 August 8S-6 struck the sea when returning from a river surveillance. Availability varied between five and three aircraft in early 1950, and then on 1 March 8S-3 lost its propeller in flight, the runaway prop smashing the top of the canopy and much of the aircraft's bow before the pilot successfully force-landed in the Gulf of Siam. The heavily damaged aeroplane was recovered by the *Paul Goffeny*. By the end of the year only five Sea Otters were available, with 8S-1 (ex-JN123) written off on 8 December. Despite remarkable efforts by the French crews, including reconstruction of the written-off former JN122 using a formerly cannibalised, stored airframe that was rolled out again as JN1220, the last of the Sea Otters were replaced in 1952, and 8S re-equipped with Catalinas.

French sailor Jean Favalessa recalled, "I won't forget the operations on the Delta, on the *Robert Giraud* and *Paul Goffeny*... Medical evacuation, reconnaissance, liaison, mail, support, in some 21 months on the LCMs [landing craft mechanised], I had the time to appreciate, seeing them working in all these places. On our LCM we liked seeing these small biplane 'zincs' seeming to wander (given the speed) around and in front of us... They saw what we could not see from our positions in the jungle!"

In 1950, a new batch of six Sea Otters was obtained from the UK to equip Escadrille 9S, in particular to support the French customs administration and

DATAFILE

Vickers-Armstrongs' civilian Sea Otter, G-AIDM, looked very presentable indeed. *AEROPLANE*

CIVIL SEA OTTERS

Like the Walrus, post-war several Sea Otters were bought with a view to civil operations where amphibious capability was going to be an advantage. This did not eventuate in significant numbers. Allan Voak, a wartime Royal Navy pilot, noted that the Walrus consumed 38 gallons of fuel an hour, and the Sea Otter a commercially unattractive (in his view) 50 gallons per hour, for the relatively small payload. The British civil register listed 24 Sea Otters, but most went overseas or simply were scrapped without finding users.

The example with construction number 014352 was civilianised from production by Vickers-Armstrongs at Eastleigh in April 1947 with a somewhat claustrophobic, furnished four-passenger cabin (with a door to the separated cockpit), and registered as G-AIDM. Up to five passengers, with removable chairs, or a stretcher case could be carried, and the centre hatch was enlarged to enable access. The cabin floor was reinforced for cargo. G-AIDM was sold to the Royal Dutch Shell Group for survey work in Venezuela in November that year, but was written off in a non-fatal accident on 8 July 1949.

G-AJFV, formerly JM959, went to Burma in April 1949 as XY-ABT, after acquisition by British Aviation Services of Blackbushe. VR-SOL was registered in 1948 — also to the Royal Dutch Shell Group — and became the first aircraft to land at Anduki airport, Brunei in 1951 after it had been constructed to support Shell operations in Seria. Previously, the Sea Otter flew from a wartime Japanese base at Lutong, Miri, and was also used to ferry Shell employees to Kuala Belait after they arrived by ship at Labuan.

Pictured in 1967, VH-BQI was the last complete Sea Otter survivor, and nearly made it into preservation. GEOFF GOODALL VIA PHIL VABRE

Other Sea Otters were registered to Redhill-based Ciro's Aviation, namely G-AKIC (JM826) and G-AKID (JM764) at Redhill, and to British South American Airways in the form of G-AJLT (c/n 181716), G-AJLU (c/n 129893) G-AKRX (JM968) and G-AKWA (JM739). All four BSAA machines remained unconverted and were scrapped at Langley in 1949.

Ex-Royal Australian Navy aircraft JN200 was sold in September 1954 to Sydney-based Air Sea Research, which converted it for civil use as VH-BQI in a smart scheme of white with red trim, intending to employ the Sea Otter on a regular commute between Rose Bay, Sydney and Newcastle, ferrying fresh fruit to the Sydney markets. During trials on Lake Macquarie, NSW, the aircraft hit a submerged stump and was holed. Repaired, it was moved by road to a farm at nearby Awaba.

Royal Newcastle Aero Club members set about fundraising and finding a home for the relatively complete aircraft, but in 1967, just before collection, a scrap metal dealer removed it. Frantic searching located several remains, including the engine under "under 100 tonnes of rubbish" at the Mount Hutton dump, as Bill Hitchcock of the club recalled. The forward hull had been cut down to make a houseboat. This was eventually rescued and presented to the FAA Museum at Nowra, the largest remaining Sea Otter relic known.

In the 1950s, two ex-British Sea Otters, VH-AJN (JN188) and VH-AJO (JN242), were erected at Rose Bay for the Australian Petroleum Corporation, working in New Guinea. Both were struck off the register after sinking at Port Moresby moorings on 21 January 1952 in the case of 'AJO and 3 June 1953 for 'AJN.

state authorities combating arms trafficking in Cochinchina, today's South Vietnam. These were given Supermarine class B registrations G-15-82 (the former JM797), G-15-84 (JM953), G-15-85 (JM879), G-15-83 (JM741), G-15-86 (JM873) and G-15-87 (JM884). They served from September 1950 with serials N-82 to N-87. One forward hull, minus canopy, was converted into a boat, still marked 9S-3. The final flight of an Aéronavale Sea Otter occurred on 21 March 1952.

Netherlands

Eight Sea Otters were sold on to the Koninklijke Marine, the Royal Netherlands Navy, for use with the Marineluchtvaartdienst (MLD, Netherlands Naval Aviation Service). The first example entering service on 17 November 1949 was the former JN107, serialled 18-4 (quickly changed to 12-4). The Sea Otters were part of 320 Squadron at Valkenburg, being intended for training and primarily for search and rescue, including on ships.

Two of the Sea Otters were hook-equipped for use on the aircraft carrier HNLMS *Karel Doorman*, previously HMS *Venerable*. The others were JM977/G-AKRF, which became 18-1 and later 12-1; JM966/G-AKYH, later 18-3 and 12-3; JM827/G-ALTX; and JM818/G-ALVB, subsequently 18-2 and 12-2. Sea Otter 19-4 had been JN107, 18-5 was ex-JN141, 18-6 was JN142, 18-7 was JN186 and 18-8 was JM984. Three were bought as spares sources in March 1950, comprising JM764/G-AKID, JM826/G-AKIC and JM827/G-ALTX.

> *"The Sea Otters were used during the 1953 North Sea floods"*

The type only saw relatively brief service. The first Sea Otter, 12-4, was withdrawn in February 1951 due to its poor condition, and replaced with 12-2 from

The former JN141 with the RAF became 18-5 in Royal Netherlands Navy service. NATIONAAL ARCHIEF

store. Serials 12-1 to 12-3 were overhauled by Aviolanda, arriving in March, April and August 1951. On 24 April 1952, 12-6 was alighting on one of the Westeinderplassen lakes when it was damaged, being written off. Exactly three months later, Sea Otter 12-7 (some sources say 12-5) crashed near Moerdijk, killing crew member W. H. Brusse. 12-3 was removed from store to replace both in use.

In May 1951 the Opsporings- en Reddingsdienst (OSRD, search and rescue) unit was formed as part of the MLD, and 320 Squadron's Sea Otters were transferred to it. During recovery efforts from the February 1953 North Sea floods the Sea Otters were used extensively on rescue flights, but that August the remainder were withdrawn from use, their role taken over by two Catalinas and two Sikorsky S-55 helicopters.

Seagull testing

The first Seagull, PA143, flew from the water at Itchen on 14 July 1948 in the hands of Lt Cdr Mike Lithgow. Longer float struts had been fitted due to issues found during taxiing tests. Further testing of the new type, now designated as the ASRI, was interrupted by appearing at the Farnborough SBAC display on 11 September. The Seagull name was a tribute to the pre-war Seagull series, not a continuation, so it was never the Seagull VI. The parasol arrangement and relatively clean design made it the first type to even remotely resemble its namesake.

The design having evolved through a number of radical steps on paper, the prototypes did not require any other significant modifications to airframe or engine, despite the unusual configuration and the particular demands of the water-borne environment.

But, not surprisingly, there were unforeseen problems. Unexpected levels of buffeting and un-commanded yawing occurred. Using a 1/16th-scale model at what was then Southampton University College, the cause was found to be air leaking between the wing and nacelle. Other flow issues were observed with the radiator flaps set open, as well as turbulent air generated at the pylon and wing aft junction, the latter particularly buffeting the tail surfaces.

Apparently complex, these maladies were fixed with one round of modifications: extending the pylon aft, sealing the gaps with rubber strips and placing shrouds over the radiator flaps. This cured the buffeting and a fore-and-aft control oscillation was rendered acceptable, even during dive tests to 268kt (308mph) indicated. The stalling speed was also reduced further, by 6-7kt. The yaw issues were overcome with a third fin and rudder, the fin later being increased in height, and a fuselage fillet added. The second prototype, PA147, incorporated these alterations. Mike Lithgow took it into the air on 2

Mike Lithgow at the helm of Seagull PA143 for a publicity photo-shoot. CHARLES E. BROWN

Seagull PA147 with race number 54, applied for the Air League Cup at Sherburn-in-Elmet in July 1950, where Supermarine test pilot Les Colquhoun flew the type into the record books. CHRIS SANDHAM-BAILEY

September 1949, and shortly afterwards demonstrated it at the Farnborough show.

Tests on terra firma included landings into arrester wires at the RAE at a weight of 15,430lb, and separately carrying air-sea rescue equipment under the port wing. Then came carrier landings and take-offs on HMS *Illustrious*. The return flights, taking five extra personnel and their luggage at the end of each day's testing, presaged the later carrier on-board delivery aircraft concept. The Marine Aircraft Experimental Establishment, now at Felixstowe, recommended improvements when testing PA143 in October and December 1949, laconically noting how "tests were delayed by a structural failure of the wing spar". Water rudder and tail surface adjustments netted further performance improvements, and RATOG was trialled. While the handling was regarded as good overall, the aircraft's great length and narrow beam, coupled with its significant sail area, meant there were always problems with weathercocking and turns on land and water, which remained unsolved.

A sleek-looking machine, the Seagull had a phenomenal speed range. At the Air League Cup race at Sherburn-in-Elmet on 22 July 1950, in the hands of Supermarine test pilot Les Colquhoun, PA147 claimed the world air speed record for amphibians over a 100km closed circuit at 241.9mph, the Seagull placing fourth in the race at the same time! Considering this was not a straight-line record attempt, and that the aircraft used the less powerful Griffon 29 engine of 1,815hp rather than the proposed production Griffon 57 with water/methanol injection delivering 2,500hp, it is even more remarkable. At the other end of the speed regime, Mike Lithgow loitered the Seagull at a mere 35mph — quite something for a type of 10,500lb, though the official stalling speed was 54mph. The estimated maximum speed with the proposed production Griffon 57 was 260mph.

> ***"At the Air League Cup race, PA147 took the world air speed record for amphibians and placed fourth"***

Intended to operate with a crew of three, production Seagulls were expected to be able to recover up to seven survivors (two on bunks, one seated and four on floor emergency stations). But the RAF's first dedicated air-sea rescue unit, No 275 Squadron, was re-formed at Linton-on-Ouse in April 1953 with Bristol Sycamore HR14 helicopters replacing wartime Walruses. As helicopter lifting capabilities quickly grew, the fixed-wing amphibian's advantage over rotary-wing equipment disappeared. Seagulls might have found a role as carrier 'plane guards', replacing Sea Otters, but there was simply no money to put a new type into production for this purpose, and the most powerful, most capable Supermarine rescue amphibians ever built were finally sold as scrap in 1952.

The relatively elegant lines of the Seagull are evident at rest on the water. JAMES KIGHTLY COLLECTION

Sea Otter RD872 landing on an Illustrious class carrier with the hook deployed. JAMES KIGHTLY COLLECTION

The brief summary of the A&AEE test crew in 1943 after the initial 100-hour testing of two Sea Otters was, "the aircraft had a better performance than the Walrus, but did not handle quite so nicely". The navigator and wireless operator both noted similarity to the Walrus, and found their stations satisfactory, but the air gunners felt both the bow and midships positions had inadequate traverse and access, while "a folding seat should be fitted for the rear gunner so that he could maintain a prolonged look out in reasonable comfort."

The pilot's notes stated, "The aircraft is stable about all three axes, but there is a pendulum effect due to the high thrust line and centre of pressure". Ground handling, due to the overall configuration was tricky in crosswinds, like most similar types. It was regularly remarked that the proximity of the propeller to the cockpit caused excess vibration and noise, as well as a significant risk for external access, and a propeller proximity warning was usually painted on the fuselage.

For landing in a rough sea, the pilot's notes advised, "Check rate of descent earlier than normal and allow the aircraft to sink on to the selected patch of water in an exaggerated tail down attitude at as low a forward speed as possible, using engine to control rate of descent and to maintain the tail down attitude. Close the throttle and ease control column back immediately before touching down". They added, "The sea is never as calm as it appears from 1,000 feet, and it is, therefore, recommended that the rough seas landing technique be used for all daylight approaches."

Supermarine test pilot Don Robertson thought, in contrast to the Walrus, "the Sea Otter was more a fair-weather boat. With an engine and whirling propeller just above one's head it seemed in many ways a retrograde step; those who have any experience of landing in rough sea will appreciate the tremendous pounding that ensues — the engine and propeller could easily land on one's lap!"

An anonymous Royal Navy Sea Otter pilot recalled, "We were expecting a normal (if that is the right word) deck landing, but noticed that three and four wires were pulled. The reason was soon clear. Those on board had summed up the situation and ordered 'land on the aft lift.' At slightly reduced power we edged up over the round-down and along the deck. being directed by ground marshalling signals from the captain of the flight deck. When we were over the after lift, he gave the order 'stop.' We reduced power to match the speed of the ship and by gradual reduction in power settled in the middle of the lift and shut down. In seconds the wings were folded, the lift lowered. and we emerged from the aircraft into the hangar. Was this the first operational fixed wing vertical landing?"

Seagull

The MAEE tests were carried out by J. Taylor. He considered the Seagull "pleasant to fly in calm conditions", but, "The noise level at take-off and climb is too high". Taylor also noted, crucially, how it was unable to turn at all on the water in winds above 15kt. Further, "the view on the ground and water is poor and inadequate for the role of the aircraft", although "visibility in the air is excellent."

Capt Eric 'Winkle' Brown flew the type, albeit only from land. "If you had flown the Sea Otter you felt at home in the cockpit of the Seagull with that lethal mincing machine whirring away behind the pilot's head", he said. "Perhaps the most noticeable improvements in the Seagull over the Walrus and Sea Otter were the much shorter take-off and the better view for landing, both direct benefits of the use of variable incidence. Also the Seagull's controls were lighter and better harmonised."

DATAFILE

A SOLE SURVIVOR?

The author has been informed of a relatively complete, previously unknown, Sea Otter wreck found by a diver in the Mediterranean, north of Cyprus. Nose-down in the sea floor, the engine configuration confirms its identity, and given the location it must be an ex-Royal Navy or RAF example. See also page 14.

First prototype Seagull PA143 gathers speed on take-off. KEY COLLECTION