FLYING BOAT SEAMANSHIP

Former RAF flying boat ground tradesman Bill Mortimer explains some of the little-known aspects of flying boat operations

THE history, design and performance of flying boats are subjects that are well documented. Somewhat overlooked, however, are the methods that were employed and the skills necessary in dealing safely and adequately with the tasks of getting the larger 'boats into the water, making sure they stayed put on their morrings whatever the conditions, replenishing fuel and payload, and getting them out again to carry out essential servicing. I would like to redress the balance, perhaps bearing in mind the immortal words of Toad in 'Wind in the Willows' in that 'There is nothing, but nothing as fine as messing about in boats'.

In the early days of flying boats, which were of wooden-hull construction and prone to waterlogging, it was common practice to keep them ashore, only launching them when fully prepared for flight. Hulls were supported on suitably-contoured iron-wheeled trollies similar to those used for medium-sized marine craft, the whole edifice being laboriously manhandled in and out of the water from a slipway. Anyone who has experience of launching or recovering even a sailing dinghy from a trolley in breaking waves can imagine the difficulty in controlling and accurately positioning a five-ton hull, with added 100-ft span mainplanes, over a submerged trolley prior to towing it up a slipway. A hazardous business indeed, not only for the unfortunate parties of wading seamen, but also for the relatively fragile structures. The carpenters were kept extremely busy.

With the development in the early 1920s of the metal-hulled flying boat came the concept of detachable 'undercarraige' legs. Fitted to strong points on the hull whilst the aircraft was in the water, they allowed easy manoeuvrability on land and had the added advantage of allowing access to the whole of the hull structure for inspection purposes. This innovation, thought to have been a product of R.J. Mitchell's genius and first evident on his Supermarine Southampton of 1925, greatly simplified the necessary beaching and launching procedures, and it was this principle that was gradually adopted and later predominated.

Every flying boat base, be it Service or civilian, developed its own techniques and organisation for handling its aircraft on water and shore, and between, to suit local conditions and levels of investment in facilities, equipment and manpower. At some bases, water handling was entirely the responsibility of a marine craft unit employing trained seamen specifically for the task, while at others a mix of aircraft engineering personnel and seamen would attend to waterborne matters. In looking at the techniques involved, the procedures followed at the Marine Aircraft Experimental Establishment in the late 40s and early 50s provide a broadly typical example. The unit, accommodated at RAF Station Felixstowe, was in the business for almost as long as flying boats were in use in Britain and handled every type of British design with the exception of the final Saro Princess.

RAF Felixstowe was situated on the east bank of Harwich harbour which consists of the estuary of the rivers Orwell and Stour draining into the North Sea. The site, now buried beneath the concrete of Felixstowe Container Port, was chosen for seaplane operations in 1913 and rapidly developed during World War 1. It was not particularly suitable for its final occupants, Sunderlands, Seafords

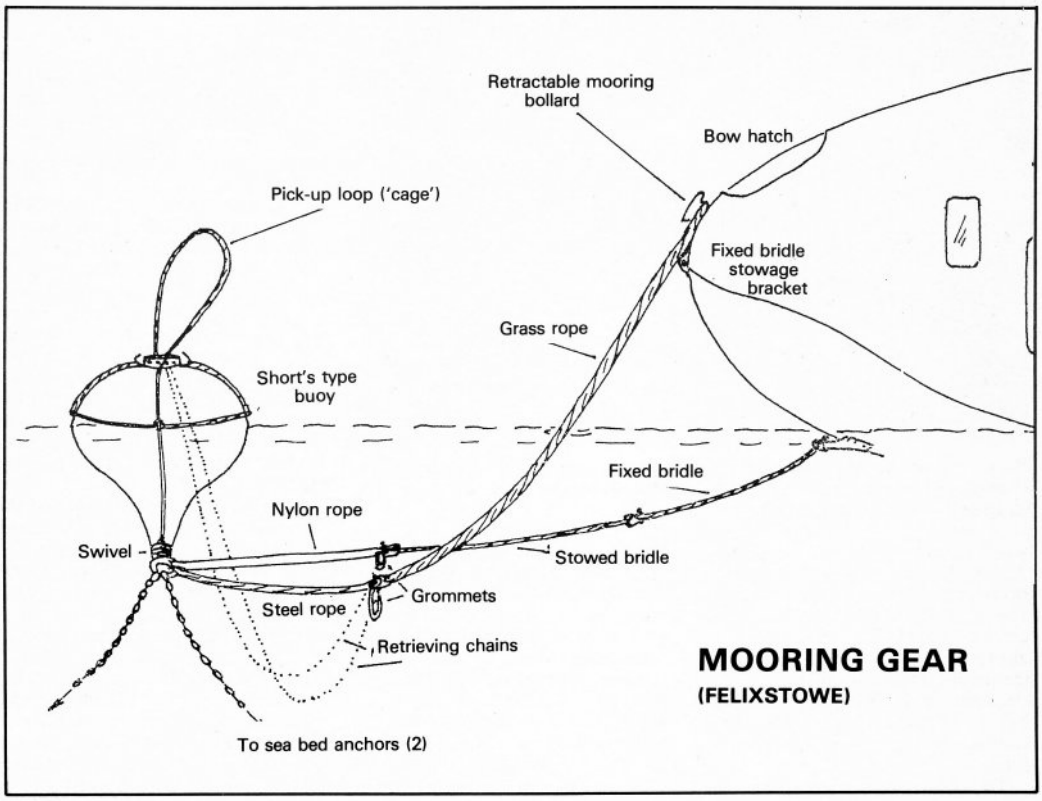
Sunderland V PP162 on a mooring at high water off Felixstowe slipway and gantries. The 50-ton Titan crane is in the background. (Bill Mortimer)

Ex-BOAC Solent 3, 'Southsea' G-AHIY sits forlornly on Felixstowe sea front awaiting disposal in 1954. Note BOAC low-level tail trolley. (via Peter Cooper)

and Solents.

The aircraft mooring buoys were spaced at intervals in a line (known as a 'trot') parallel to, and about 200 yards off, the shoreline which formed the western extremity of the Station, and were a little too close for comfort to the main shipping deep water channel which ran that side of the harbour. This area was also subject to the maximum tidal flow, the ebb on occasion reaching a speed of over six knots. Although the moorings were well sheltered from easterly winds by the large hangars and buildings of the Station, they were directly at the mercy of the prevailing westerlies which were unimpeded across the flat Suffolk landscape which terminated one mile away across the harbour. Thus, a combination of strong wind from that direction and an ebb tide could create very uncomfortable conditions for handling aircraft up or down the slipway and on the moorings. It was also possible under certain conditions of opposing wind and tide to find that, due to the strain imposed, an aircraft could not be released from its buoy.

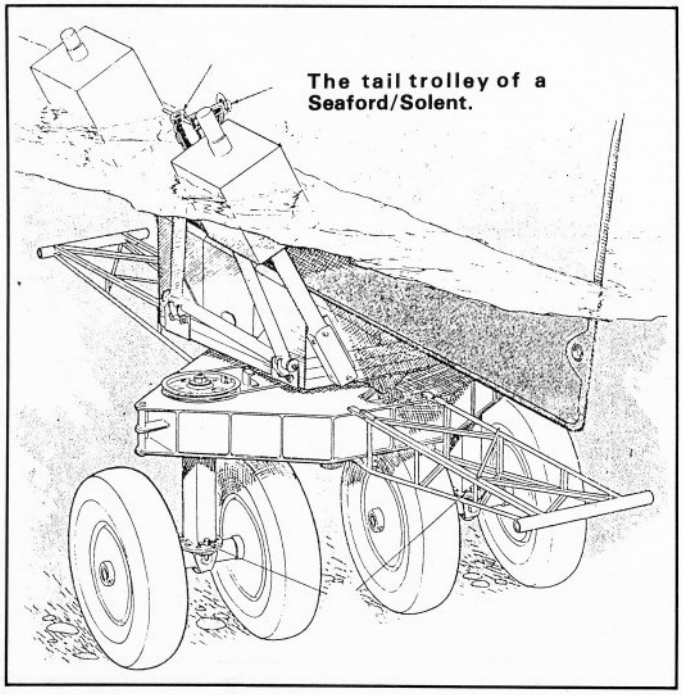
From a wide apron in front of the hangars, locally known as the 'sea-front' a concrete slipway, supported on piles, ran into the sea, flanked on each side by concrete piers known as gantries which were just wide enough to allow the manhandling of ropes used to control aircraft until they were safely on the slipway. The slipway, unfortunately, terminated above the level of Low Water Spring Tides (the lowest tidal level in any lunar period) which tended to restrict the times at which an aircraft could be moved on to or off the slipway. No stationary power winching was installed, the prime mover of aircraft on their beaching legs being the standard RAF refueller.



MOORING GEAR
(FELIXSTOWE)

LAUNCHING

Following a period of inspection or repair, an aircraft (Sunderland, Seaford or Solent) would be towed out of the servicing hangar (circa 1918), its tail trolley being steered by two stalwarts, and positioned on the top of the slipway with main beaching leg wheels just behind the incline. The tanker tug was then attached by a heavy manila rope passed through a single sheave pulley attached by shackle to the aircraft's rear step attachment point, the freed end of the rope being wound on to itself to provide a means of release. The aircraft's outboard engines were then started and sufficient power applied to move the aircraft forward until it was descending the slipway under its own weight, the tug restraining it to a slow walking pace. Just before the tail trolley reached the water's edge, the aircraft was halted to allow the tail trolley to be unlocked and attached to the slipway by a retrieving line. The aircraft was then released to taxy out to a mooring buoy, the tail trolley floating free to be manhandled on its retrieving line up the slipway for washing down and servicing for future use.



The tail trolley of a Seaford/Solent.

Once safely moored to a buoy, the aircraft's main beaching legs were removed, usually a straightforward operation if carried out from the flat hatch cover of the standard RAF Bomb Scow, an ungainly barge of 33-ft length which made a working platform of ideal hieght under the mainplane. The weight of the leg was taken by a chain hoist attached by ring bolt to a strong point on the aircraft main spar, and after disconnecting the lower fitment and steadying strut the leg was lowered into the water to float under tow back to the slipway where it was man-handled into a servicing bay. Considerable care was needed to ensure that these weighty items did not get out of control when being lowered away from the aircraft as damage to chine angle plating could easily happen, especially to Solent or Seaford aircraft. Indeed, a short choppy sea running could well cause the operation to be postponed until conditions eased.

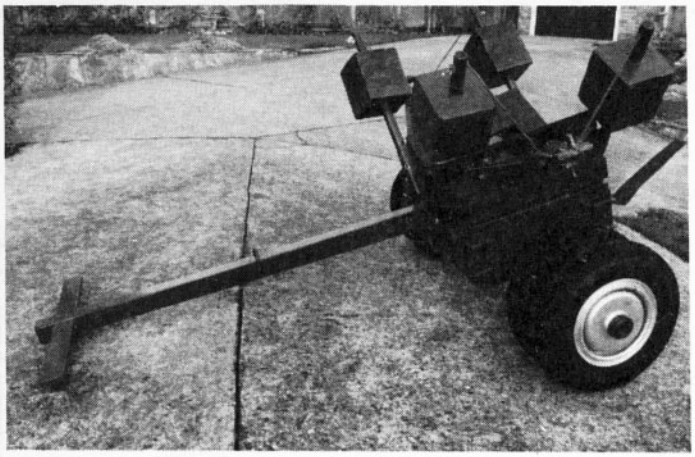
SLIPPING MOORINGS

If, following launching and leg removal, an aircraft was to be immediately flown, the airframe fitter (rigger) responsible for his aircraft would have moored to the buoy temporarily by 'short slip'. This comprised a length of stout manila rope with a loop spliced into one end which was passed over the aircraft's mooring bollard, the free end passed through the 'cage' or pick-up loop of steel wire on the buoy and back to the bollard and made fast. This provided a secure means of mooring provided a watch was kept on it and allowed the aircraft to taxy away as soon as engines were started by simply releasing the free end. Sir Gordon Taylor's *Bird of the Islands,* his account of 'boat operations in the South Seas', contains some interesting comments on buoy-leaving procedures.

On the Sunderland and Seaford, the front turret was rolled aft and an internal platform and bollard erected for mooring operations. The Solent had a retractable hook-shaped bollard in the bows and access was gained through a bow hatch large enough for one crew member. As the aircraft taxied out, the rigger would stow all equipment and ropes, check the aircraft visually from his position in the bows, close the turret or hatch and, after checking all water-tight doors and hatches, take up his position under the astrodome on the flight deck. The speed of closing up in the bows would depend entirely on the weather prevailing — instantly on a wet day in January, but delayed as long as possible on a glorious summer morning, for standing in the bows whilst full bore engine runs were carried out with the aircraft roaring over the surface at 40 knots with sparkling rainbows round the props from the spray was a heady experience indeed!

MOORING

The correct approach and alignment of a flying boat, to make gentle contact with a mooring buoy, demanded the utmost skill on the part of the captain and a considerable degree of dexterity from the rigger. At Felixstowe, it was traditional that, as a rigger, one just did not miss the buoy — if the skipper brought the bows in range that is — and sometimes that could be very difficult to achieve. With outboard engines only, at rock-bottom revs, a boat would move through the water at a fair walking pace in calm conditions but the speed could vary dramatically, dependent upon tidal and



Sunderland type tail trolley. Manufactured by Captain Vic Hodgkinson for 'Beachcomber', Southampton Hall of Aviation. (Captain Vic Hodgkinson)

wind conditions and directions. Approach to a buoy was always, in principle, head-to-wind, but a strong tide setting across wind could produce a crab-like approach. There were never two identical sets of circumstances, the strength and direction of wind being infinitely variable and similar circumstances applying to tides.

To ensure minimum speed on the water, two conical canvas drogues were carried which were towed astern from strong points in mid-hull in the case of Sunderland/Seaford and from the bows on the Solent. These acted as a water brake and were retrieved by pulling in on a trip line as soon as the aircraft came to rest lest they became entangled with the buoy and its collection of chain and cable. On reaching the buoy, the rigger would pass the free end of the 'short slip' rope through the pick-up loop on the buoy and very rapidly make fast, at the same time signalling to the captain to cut engines, and the 30-odd tons of aircraft would be stopped in its tracks. In handling the ropes and steel cables of all mooring gear, it was essential to mentally pre-plan for the unexpected and each rigger developed his own techniques to make life on the water just that bit more simple. Written instructions were few.

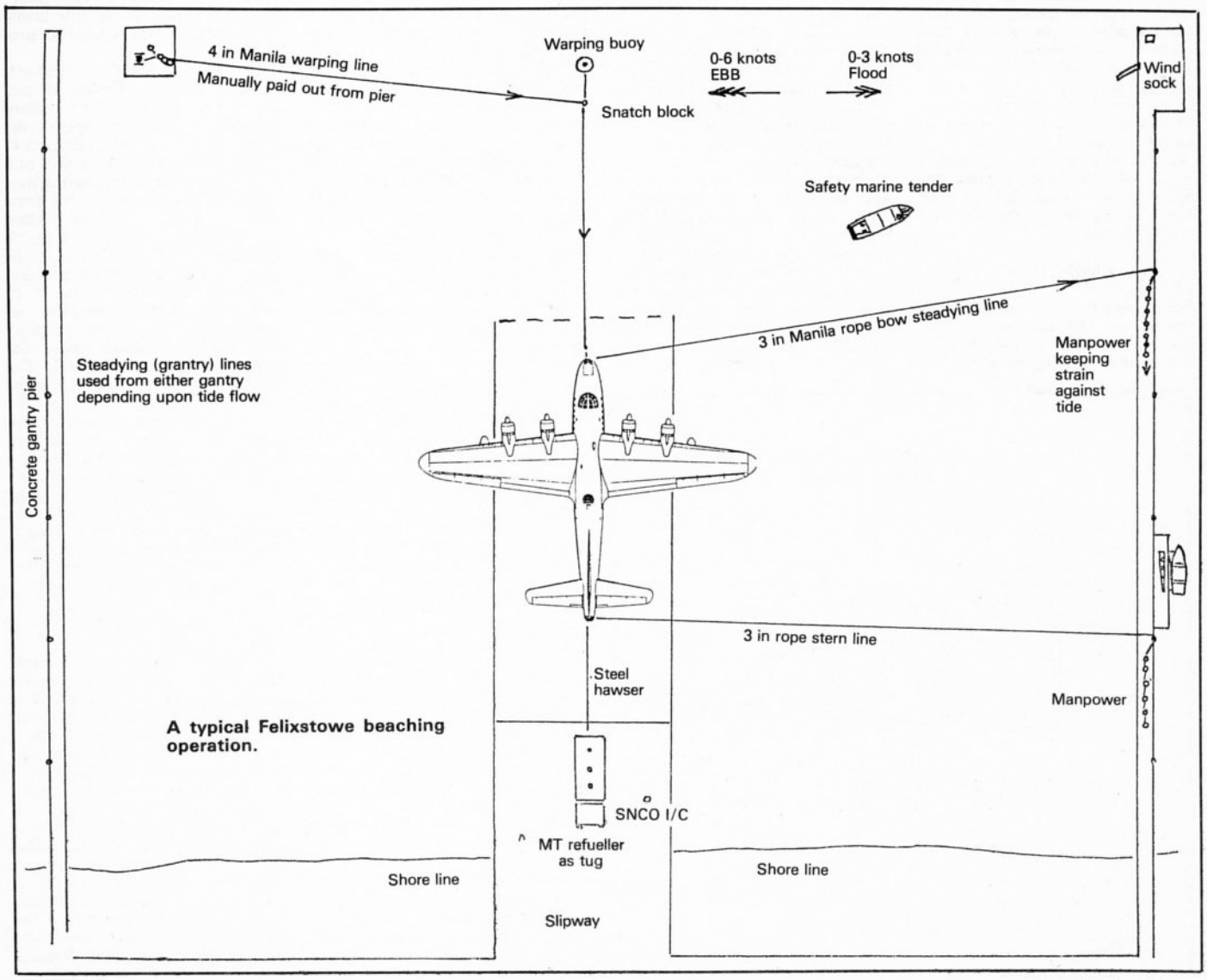
Once moored on 'short slip' with engines stopped, secure mooring could be undertaken. On each buoy two strops, one of rubber-covered nylon rope and one of steel wire, were attached below the buoy to the large anchor chains and their free ends, to which were fitted steel wire rings (grommets) looped over stowage hooks on the top of the buoy. The Short's Type buoy was of heavy rubber and lightly inflated to prevent damage to aircraft hulls.

On the bow keel member of the aircraft, a steel cable (the fixed bridle) was permanently shackled to a stainless steel bracket below the waterline, this cable being shackled at its upper end to a stowage bracket within reach of the bow hatch. A stowed or intermediate bridle was shackled between the end of the fixed bridle and the nylon strop on the buoy to form the primary load-bearing mooring. The aircraft's anchor chain, in the case of Sunderland or Seaford, or a grass rope on the Solent, was shackled to the buoy's steel strop. When these connections had been made, all the shackles were firmly wire locked (known as 'Moused'), the short slip released and the aircraft rode back secure.

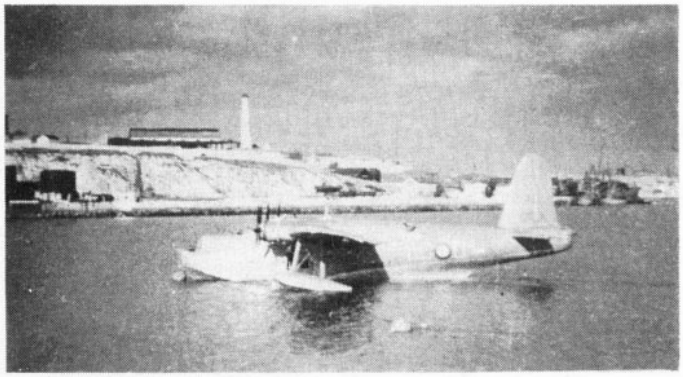
To disconnect these moorings before moving the aircraft it was necessary to first take-off the strain and return to 'short slip'. The Sunderland and Seaford, being fitted with a useful anchor chain winch presented few problems, but with the Solent it was necessary to haul in the grass rope hand over hand to bring the aircraft up close enough to the buoy to attach the short slip before disconnection was possible. This was a very wet, cold job which on most occasions took a great deal of effort, and, as mentioned previously, could sometimes be impossible.

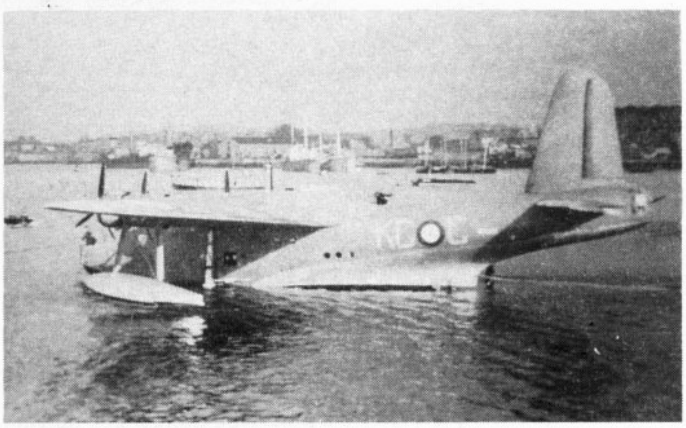
REFUELLING, LOADING AND TRANSPORT

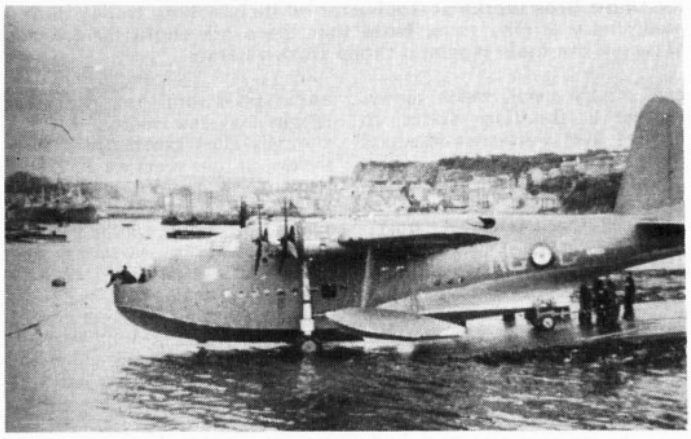
Fuel was delivered to aircraft on moorings by the standard RAF Marine Refueller, a steel, self-propelled barge of 53-ft in length and 12½-ft beam carrying a maximum of 3,250-galls of 100-octane Avgas delivered by engine-driven pump, and 300-galls of engine oil hand-pumped. Although highly manoeuvrable, they were ungainly and difficult monsters and only the most skilled RAF Marine Branch coxswains

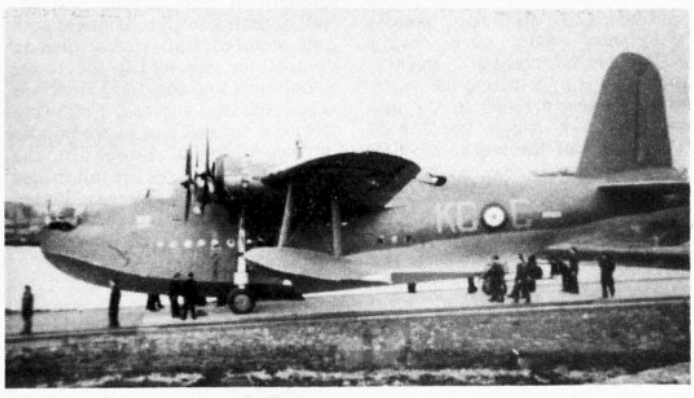


A typical Felixstowe beaching operation.









Sunderland Mk.1 of No.10 Squadron RAAF at Mountbatten in 1940, coming up the slipway from a calm Plymouth harbour. Ideal conditions without adverse winds or tide. (Captain Vic Hodgkinson)

were trusted to operate them. They also offered no protection to the crew of two who always remained cheerful even in the worst of the cold, rain and sometimes driving snow. Although the number of aircraft at Felixstowe was limited, calls on the refuellers were many, as aircraft weights were constantly adjusted by varying the fuel load to meet experimental requirements.

Prior to refuelling, or the reverse, the rigger would bring the aircraft to 'short slip' and release the moorings. In the case of the Solent, a manila rope of at least 100-foot length would be shackled to the buoy strop and then the aircraft was allowed to drift back far enough to accommodate the refueller between buoy and aircraft bow. In Sunderland and Seaford, the anchor chain was paid out by the same amount. The refueller would then moor to the buoy and swing the stern in to within a short distance of the aircraft's bow so that the twin refuelling hoses could be passed up over the cockpit to the mainplane tanks. Maximum delivery rate was 140-gpm (rarely achieved) and the operation usually occupied over an hour, which always seemed longer in winter! On completion, the aircraft was returned to the buoy — usually a very long hard pull.

It was, of course, essential to have marine craft available at all times to transport personnel and stores between aircraft and shore and to provide safety and fire fighting facilities. Transport was by a 24-ft Marine Tender, a wooden clinker-built craft powered by a Perkins marine diesel engine. There was a small forward cockpit for the coxswain who was protected from the elements by only a canvas screen or 'dodger', and a large cockpit aft could accommodate up to eight persons. These craft, with a maximum speed of 14 knots, were the workhorse of the station and were known everywhere as 'dinghies'. They were very 'wet' boats in any form of choppy sea and difficult to handle. The consummate skill of their coxswains was constantly admired, they being able to bring their craft alongside or hold station wherever required with consderable elan. The bellow of DINGHY-Y-Y!! across the water to summon transport was a common feature of life. No.1103 Marine Craft Unit was our constant saviour and responsible for all marine support including the sleek 40-ft Fire Tenders which raced alongside with us at the end of a landing run.

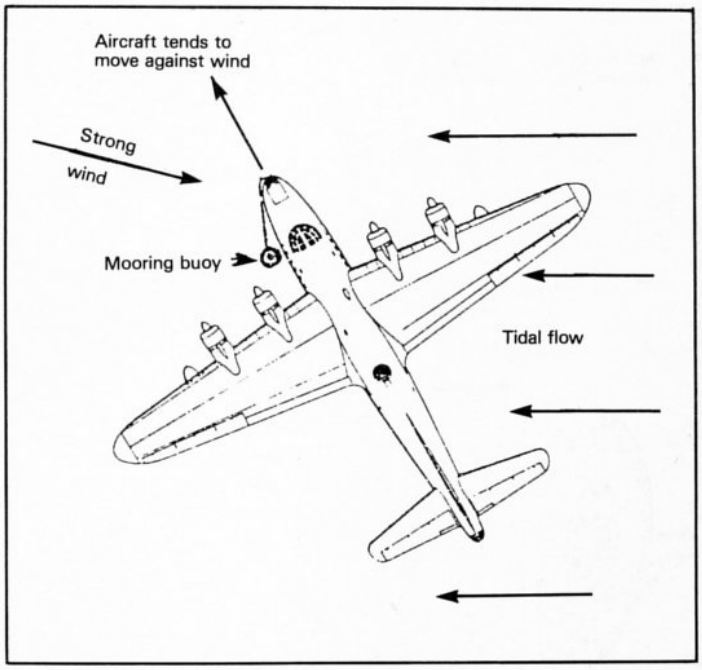
BEACHING

Although aircraft would normally reside on the water the time would eventually come when 'beaching' was necessary to perform routine inspections or to carry out repairs or replacements which were impracticable on water. Hulls also acquired weed and barnacles after a time, and there was always the ever-present problem of corrosion to fight. Felixstowe's aircraft were also prone to float and hull damage and in consequence 'beaching' was a very frequent performance indeed.

The whole operation, to get an aircraft up the slipway and into the hangar, invariably occupied at least three hours and much depended upon the state of the weather and tide. It was preferable to aim to have the aircraft touch the slipway at 'slack water' at the top of the tide, (that is at the time when the tide has reached its maximum height but has yet to reverse its flow — a period of about one hour). In consequence, some forward planning was essential. It was not possible to get an aircraft up the slipway if operations commenced much after one hour after high water, and in any case a full ebb tide made life difficult. Much better to wait (unless the 'boat was sinking'!) until the next flood tide and start about three hours before high water.

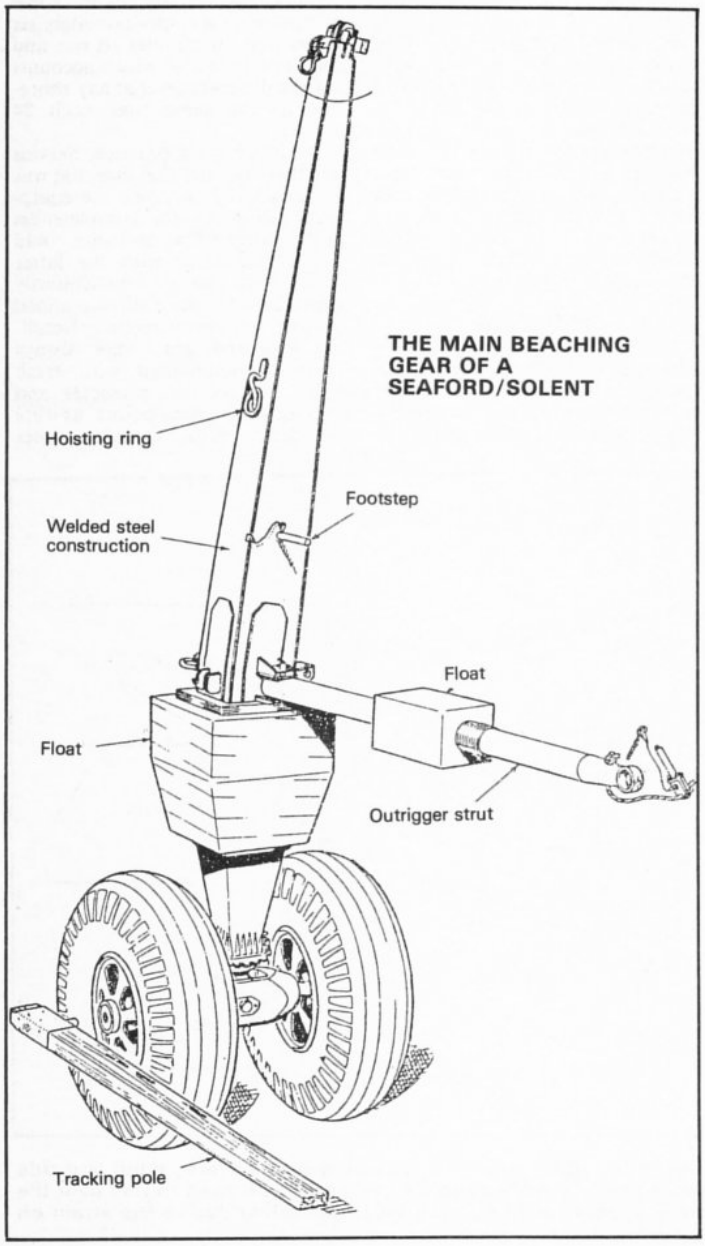
For the non-nautical, the tides around our coasts, with some exceptions, take approximately six hours and 40 minutes to rise and the same to fall — which accounts for the different level at any shoreline at the same time each 24 hours.

As in all good practice, Service or otherwise, the first essential was to gather and check all the equipment necessary for completeness and serviceability, and one could rarely find fault with the latter which was always meticulously carried out by our civilian-manned ground equipment section. Beaching legs and gear were always perfectly maintained with fresh paint, correct tyre pressures and greased attachment points, as were the chain hoists, shackles, ropes



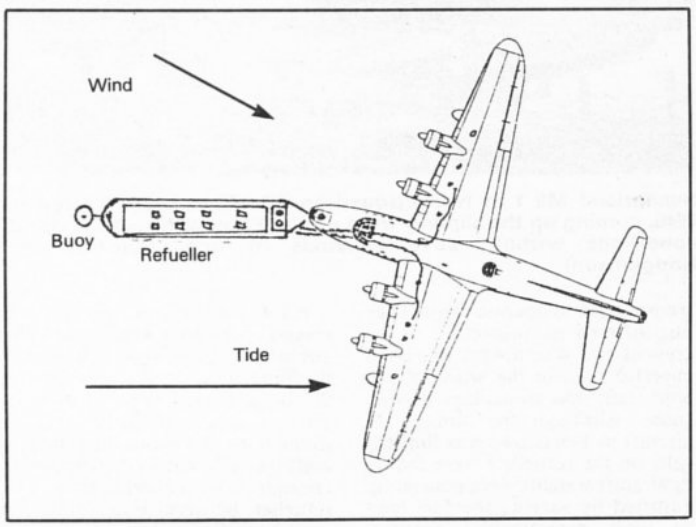
The 'impossible' condition, showing how adverse wind and tide could produce a situation where the aircraft tried to ride over the buoy, making slipping moorings impossible due to the strain on mooring strops.

An excellent pre-war picture of the prototype Sunderland outside the Short Bros works at Rochester on its beaching trolley during preliminary engine runs. Note that there are slight differences between the main legs and those shown below.

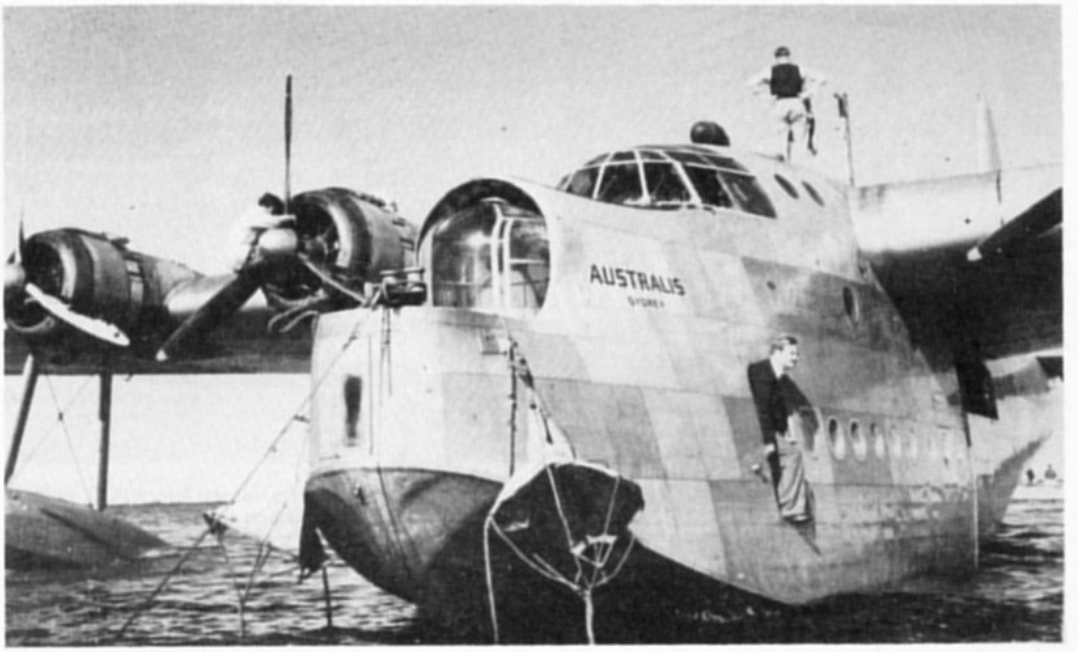


and sundry items which always carried a flotation device to prevent loss. Particular attention was paid to the balsa filled flotation blocks attached to the main legs, which were covered with well-doped fabric. A sunken leg in Harwich harbour, before the days of the aqualung, could prove embarrassing. At this stage, the aircraft weight would be adjusted by defuelling to ensure that the slipway weight limit was not exceeded, and the main beaching legs towed out and fitted. Manpower for this task was drawn from the servicing personnel, both Service and civilian, usually 'volunteers' who were readily available in summer but in remarkably short supply during the winter months! New arrivals to the unit were given a rough baptism in every sense of the word, most of whom who had never set foot on the heaving deck of a small craft, and to whom the nautical terminology and environment was a totally alien experience. Nevertheless, in four years we never lost a man! Neither did we possess any form of survival equipment or special protective clothing apart from sea-boots, sweaters and duffle coats. Mae-Wests were far too cumbersome, too.

Main beaching legs were hoisted up to the vertical position by chain hoists and then connected to the top attachment points at the mainplane root end. This could be an extremely arduous job with any strength of tide flowing past the hull or with a swell to contend with and required four strong men to control the leg whilst the lower attachment and steadying strut was connected and secured. Following this, the aircraft was moved under outboard engine power to the warping buoy where the tail trolley was fitted. This item was floated



Refuelling in ideal conditions.



Bow mooring compartment in a converted Sunderland III. Note turret retracted, mooring bollard in place, and drogues drying after use. (Dick Froggatt)

out behind a dinghy, pressed down under the aircraft rear step and allowed to float up into position where it was locked into place. Invariably a very wet job, it was best undertaken by two men in the 16-ft rowing, or 'dumb', dinghy kept on davits on the starboard gantry for the purpose.

To control the aircraft's progress up the slipway a system of warping lines was employed, manned by parties of sometimes reluctant non-technical airmen, and the whole operation was under the control of an experienced SNCO with loud hailer on the slipway.

The main warping line was led from a pier, through a pulley (snatch) block shackled to the warping buoy mooring strop and then to the aircraft fixed bridle in the bow. A towing tanker would be reversed down the slipway to the water's edge and a heavy cable connected between it and the towing point on the rear step of the aircraft. Depending on tide flow and wind strength, additional warping lines would be connected to the aircraft fore and aft and led to parties of men stationed on the gantries. These would hold the aircraft laterally against the tide to keep it lined up with the slipway as it moved astern. With tension retained on all warping lines, paid out as the aircraft moved up the slipway, it was slowly towed out of the water when all lines would be disconnected and returned to their stowage points. It was often necessary to employ two tankers to take two 'bites' at the towing line if an aircraft was beached at a low state of the tide, making the towing distance long.

Finally, the aircraft and all the equipment was thoroughly washed down with fresh water, the float drain plugs removed and any accumulated water pumped out of the bilges before it moved into the hangar.

OTHER AIRCRAFT TYPES

Of the other aircraft types in use at Felixstowe in the years just prior to the unit's closure in 1953, the Sea Otter, Seagull and Sealand being amphibian proved fairly easy to launch and recover. The 50-ton Titan crane, which was a long standing feature of the local landscape, was also regularly used for launching and recovering these smaller types when conditions prevented taxying on to or off the slipway. This crane was capable of lifting the early Sunderlands and 'C' Class 'boats, but, probably due to the fact that it was the only crane in Britain suitably placed to do so, lifting points were deleted from later marks of Sunderland and not fitted to either Seaford or Solent. The most difficult aircraft was undoubtedly the Saro SRA-1 jet flying boat. When in the water, there was insufficient clearance beneath the wing to place a boat and the beaching leg attachment points were submerged. Several trials proved that conventional launching and beaching methods were impracticable and in consequence the crane was always used. Had this prototype been accepted into service, considerable cost would have resulted in providing adequate docking and handling facilities, although the invention of the diver's wet suit may well have solved the problem!

In conclusion, it must be said that the involved and labour-intensive work of handling was a decisive factor in the eventual demise of the flying boat. Only considerable investment in sophisticated docking facilities might have saved the breed. Strangely, but too late, the wheel turned full circle with Martin's brilliant jet Seamaster — which used an advanced trolley to come ashore under its own power. ■

Right: Ideal conditions. A Sunderland III NJ188 of No.330 (Norwegian) Squadron at its buoy. Both wind and tide are coming from the same direction thus presenting the right sort of parameters for immediate taxi and take-off should this be needed. Below: Tail piece. These four Sunderland Vs are moored in the channel outside Short Bros Belfast factory at the end of the war.