RNZAF Sunderland Memories by Robin Klitscher
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SUNDERLAND ON PATROL, NINETEEN FIFTYSOMETHING. PART 1

Flying Sunderland "boats" on maritime patrol seemed always to mean getting up at an unsociable hour. Perhaps because they cruised so leisurely, it was necessary to take off at the crack of dawn, or earlier, in order to be sure of doing anything very much before nightfall.

Having arisen however reluctantly, the immediate purpose is to satisfy the engrossing hunger that is a part of such small hours. A sympathetic system makes available a breakfast of monumental proportions at the Combined Mess.

Then to the squadron for briefing. Close-in, lights on the hard-standing reflect on the water in the pre-dawn stillness. Farther out, the water ripples in light airs coming down the channel. Ground crew are busy. Marine Section tenders fuss around the jetty, and ruffle the surface between shore and aircraft. The control launch is readying to put out.

In the operations room the navigators plot the patrol on their charts. The weather will be mostly broken cloud, some showers, wind on average 350 degrees at 15 knots, except for a front lying across the route about five hours out. They hunch over their computers - not the modern digital variety, but a device with a circular slide rule on one side and a wind-and-course triangulation gizmo on the other.

The flight engineers worry about fuel load and all-up weight; and the signallers about frequencies, morse keys and code books. The pilots worry everybody including themselves, quiz the ground engineers, and eventually condescend to sign the maintenance release and the flight authorization.

It is not yet light as they go to the jetty, to the barge, and to the aircraft. The captain asks who has the flight rations - meaning what is in them? It will, after all, be a flight of more than twelve hours and he needs to savour the possibilities in advance.

The great white aircraft looms up in the half-light. “Watch it” calls the captain to the coxswain as the barge noses under the overhang of the wing, in his early morning irritation making an attempt to stamp his authority where it does not belong. The marine diesel bubbles briefly under power as the boat is brought to a halt with a scratch of rubber when the gunwale fender kisses the side of the aircraft. The mooring buoy streams out ahead, though the aircraft lies awkwardly askew under the competing influences of the tide and a now-rising breeze.

Aboard, the aircraft stinks. It has been tightly closed up overnight. It is redolent of salt water, mildew, verdigris, oil, fuel, sweat, old cooking and a primordial blend of liquids slopping in the bilges. Hatches quickly swing open to admit fresh air.

The navigators lug to their station on the upper deck their heavy bags of charts, logs, sextants, pencil boxes, protractors, dividers and other symbols of their art. The signallers and engineers repair variously to their stations and to other parts of the hull on their appointed pre-flight duties. One goes to the galley on the lower deck.

The Sunderland was always in two minds whether to be ship or aircraft. In New Zealand service as

the Mark V, it was designed and built by a shipyard, Short Brothers and Harland of Belfast. Of semi-monocoque construction it was a four-engineed high-winged monoplane, so it was said. But it had a bridge, a wardroom, a galley, a keelson, chines, both a nautical and an aeronautical almanac (and nautical and aeronautical charts), a fog bell, an anchor and a leadline.

The galley was a grand misnomer for a cramped space where one cooked upon two Primus stoves on a bench with a sink. Hard beside was a ladder leading to the upper deck. This and the other compartments ran full across the width of the hull.

The galley had a sizeable hatch either side. Beneath each was a large container for the sea drogues. The aircraft had neither sea rudder nor water brake. On the sea it was steered and the speed was controlled by a combination of asymmetric power from the engines, the air flaps, the ailerons, the air rudder, and the drogues which were launched by hand from the galley hatches. These were windsock-shaped canvas sleeves with a thin wire hawser cleated to a frame on the bulkhead. Once deployed, the force of the water flow usually meant they could not be recovered until the mooring was complete - and even then with difficulty in a strong-flowing tide. They had a spill rope attached to their tail so they might be collapsed again if need be, but it seldom worked reliably. It was better to assume that once deployed they stayed deployed, which normally meant the pilots had to call the one-shot moment with care.

Next forward of the galley was the wardroom; also a grander name than the compartment deserved. There was a bunk down each side and a fixed table with fold-down leaves in between. Naturally enough, even with the leaves propped open the surface remained out of reach of a diner of normal proportions seated on the bunks; and the height was as badly matched. To give a feeling of home, however, the table was finished in a tasteful light green. The deck was bare dural, though with worn remnants of green paint, strengthened underneath by stringers, their skeleton outline emphasised by depressions and bruises in the much-worked surface between. The walls were bare dural as well, being the thin outside skin of the aircraft. No padding, no lining, no gestures to liveability; just the skin marked out by vertical constructional ribs and horizontal longerons, punctuated by tastefully rounded portholes. The wardroom became an action station on operations, for it housed the sonobuoy acoustic receiver.

Wardroom and sonobuoy receiver

Throughout the lower deck and beneath the decking, a bulkhead sealed each compartment from its neighbours. Above the decking, doorways between were fitted with swash doors extending the watertight isolation of compartment from compartment to about three feet above the deck. These could be opened but were normally dogged shut. To pass through one could open the swash doors after wrestling with the dogs or simply step over them, the latter for preference, though at some risk to the person, especially those shorter in stature. The lower deck panels had ring latches so they could be lifted to get at the bilges and dark spaces beneath, should the need arise.

Aft of the galley was the bomb room. This contained marvels of expedient engineering. In a flying boat, breaching the planing hull to provide such as bomb or torpedo doors is a design challenge. Here, the designers had chosen not to tackle the challenge head-on, but to avoid it. The weapons were carried wholly inside the hull. Bomb racks were mounted along the lower line of the wing two decks up. To load or reload in flight there was a winch, hand operated by chain, to lift the ordnance from the floor to hook up to the racks.

So far so good. There remained the problem of getting the racks outside and clear of the airframe so the weapons could be dropped. The design engineer had provided an ingenious system in which, one supposes, as each problem was solved another arose to be solved in its own way. Sequential engineering.

The racks ran out on rails beneath the wings, powered by an electric winch (or if that failed, by a crank wound by hand). When the racks were retracted inside, flexible strips were drawn over the rails set into the under-surface of the wing so the airflow would remain undisturbed by the discontinuity.

But with the racks inside and needing to get outside, the fuselage walls were in the way. Very well; put a door each side. These were not ordinary doors, however. They could not be hinged outward for reasons of slipstream, nor inward for reasons of space. So they slid vertically in a frame, from high up under the wing root where the bomb racks were poised on their rails.

It was necessary to seal around these doors, otherwise the spray would come in during takeoff and landing. Therefore the mounting frames were designed to move bodily inward to break the seals, whereupon the doors could drop vertically downwards along guides in the frames. The release latch to effect this was operated electrically from the cockpit, with a local manual release for emergencies. The tensioners that sprung the frames clear, breaking the seal and giving the doors room to drop, were none other than stout rubber bungees - and the doors were similarly cushioned as they fell to the limit of their travel. The original bungee jump - eat your heart out A.J. Hackett!

Aft again was another compartment with bunks, graciously called the after crew compartment. From there the floor sloped up toward the tail and the rear gun turret, with a chute nearby for dropping flares and smoke markers. This, too, had an example of thoughtful engineering design, practical though looking slightly home-made. Should a flare become jammed in the chute and burn, the results might be serious. The safety device was a broomstick, conveniently clipped to the wall, which one could use to persuade the errant flare to depart.

Nearby there was another monument to the nature of this beast. On the starboard side near the rear external door there was a box. In it was an array of rubber stoppers in various sizes with which to plug leaks in the planing hull. Likewise it housed a number of heavy coir mats. And there were generous wads of ordinary plasticine for the same purpose (but not in bright kindergarten colours, only regulation dingy grey-green).

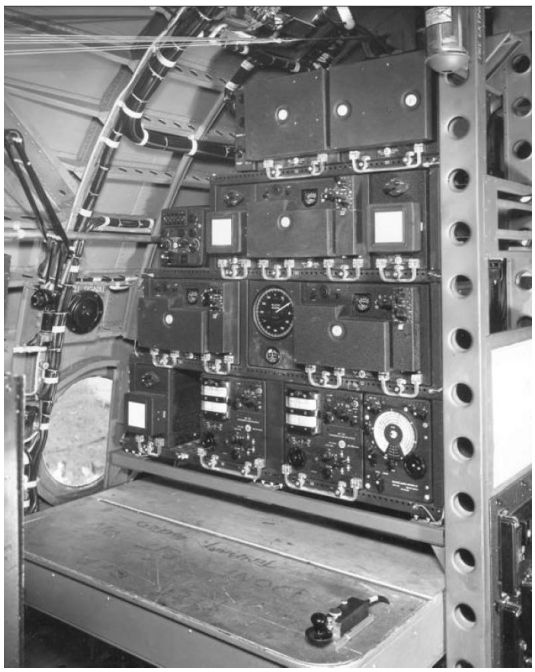
Turning and moving forward again there was a step to the upper level via a hinged bridge between fixed platforms on each side. These were the waist gunner's positions. Wide hatches opened to enable a hefty point-five Browning machine gun to be mounted on each side, the barrel sticking out into the airflow. It was a free-firing weapon; if the gunner forgot to screw in the safety stop he was quite likely to shoot up the wing float in the heat of the moment. It did happen.

Photography from the port beam hatch (waist gun hatch)

Moving on forward we mount up a ramp and through the central box wing structure to a tiny door at the back of the crew deck. On this ramp, to the right, was a significant device. The Sunderland in RNZAF service was equipped with the ASV Mark 6C maritime radar. But with gun turrets at the nose and tail of the fuselage, and the planing hull underneath, there was no place for the antennae but the wingtips. A radome blister was therefore attached under each. That presented a further difficulty. The radar had to look down to the sea, but from each wingtip the hang of the fuselage blocked out a goodly part of the sweep. The solution was a hefty waveguide switch which transferred the radar energy from one wing to the other at the appropriate moment each scan. With the radar running it did this with a noisy clack-clack, at least loud enough to be audible above the roar of the engines, un-attenuated by the thin aircraft skin.

Moving forward again (and being careful not to fall through the open hatch into the galley below) there was the engineer's desk on the right and, stepped just forward of the front wing spar, the signaller's desk on the left. The engineer faced aft watching his panel with the engine health gauges and all of the fuel gauges and supply cocks.

Engineers Station


Signallers station

The signaller faced forward, presiding over an array of heavy black boxes by Marconi, with mysterious dials and knobs and, under the covers, tuning devices curiously named pecking motors. Fixed to the desk was a morse key. Though the aircraft used HF voice modes extensively, morse procedures were a prominent and necessary part of communications. Some signaller aficionados disdained the supplied key, and fixed their own personal "bug" in its place. This was a clever semi-automated two-way switch operated between forefinger and thumb. When the lever was moved one way a weighted spring trembler produced a stream of dots, whilst for a dash the lever was moved the other way. It provided for greater Morse speed, though in turbulent conditions it could be more difficult to use without stammer than the standard key.

Above and centre was the astrodome. In the air this was a good lookout point besides being the mount for the navigational sextant. On the water the hatch and dome could be removed for egress to the top of the fuselage and the wings. At the rear edge of the hatchway was the engine starting panel, complete with priming pumps, selectors and starting booster controls. However, unless one was an eight-foot giant one could not see out of the dome or the hatch from the flight deck. There was provided, therefore, a stowable platform to stand on.

Moving forward, the navigator was on the right and the tactical navigation table on the left. The latter had a ground position indicator, a machine which projected a crossed arrow onto a chart from above, purporting to represent the aircraft's position during ASW manoeuvres. It was intended for short-range tactical use only, being an analogue device of bell cranks and pulleys which was reliable for all of a minute or so after it was set up.

On the right was the radar tent, just behind the co-pilot's seat. It had black curtains all round, which had to be closed in daylight if the operator was to make much of the screen. It was also a nice place for a kip.

Forward yet again to the pilots' seats; or the "bridge", since this was a boat. Instruments on the panel, throttles and other engine controls in between the seats, flying trims overhead, and switches placed at random all around. Between the seats and just aft of the throttle pedestal, another opening led below to the bow compartment.

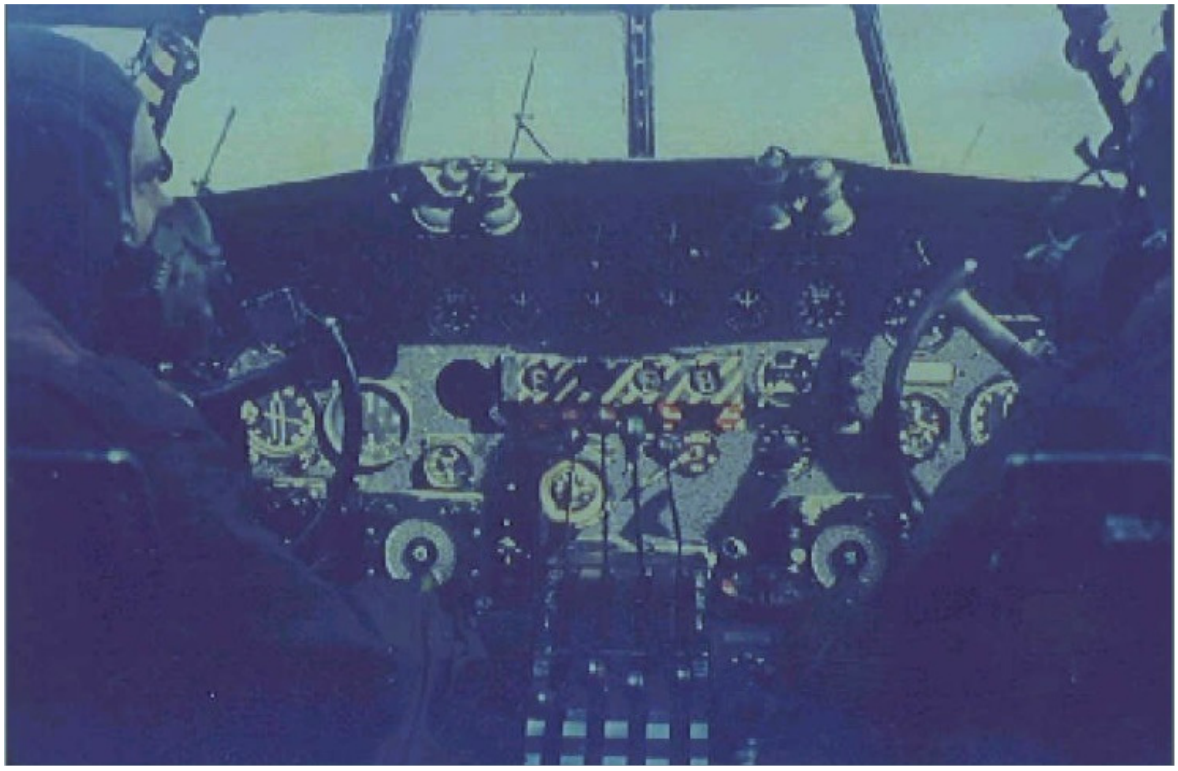
On the deck to the left of the captain's seat was the standby P-type magnetic compass; and near it the bomb door and rack actuation switch. If sufficiently ham-footed it was possible to kick this switch into action with the left heel, to the sudden consternation of others, especially those in or near the bomb room.

To the right of the co-pilot's seat was the bomb sight controller. This was yet another wondrous example of analogue ingenuity. The bomb sight itself was mounted forward in the bow compartment, looking though a thick transparency just below the front gun turret. It was an angle rate device. From the ballistics of the store to be dropped and the height and speed of the drop, one could calculate how far before the target to make the release.

Working out that point in space was one thing, but to know when one had arrived at it was quite another. The bomb sight had a transparent barrel on the surface of which were etched fine black lines in a gentle spiral. The axis of the barrel was aligned fore-and-aft. When the barrel rotated the lines could be seen against the background, but because of the rotating spiral they appeared to be moving steadily rearward. Now, as anyone knows who has watched roadside poles from a moving car, when the pole is well ahead and the angle of sight is oblique, the pole appears to be moving slowly. It picks up "speed" as it approaches until it zips past and is history.

The same principle applied with the bomb sight. If the moving graticule was adjusted according to the calculated conditions of height and speed over the ground, there would be a point at which its apparent speed and the speed of passage of the target as viewed through it would coincide. That would be the release point, and the co-pilot wound in the parameters to set the graticule speed for the bomb aimer. Great in theory; somewhat more problematical in reality.

The engine controls too were unusual. Wires and pulleys were not for the throttle levers or the propeller pitch controls in the Sunderland. They worked by hydraulic action known as the exactor system, whereby there was a pipe full of fluid connecting each throttle or pitch actuator in the pedestal with the relevant receptor on each engine. Movement of a small piston at the cockpit end caused a corresponding movement by a similar piston at the other end. Very clever; but in the case of the throttles, unless one had arms the length of the average gorilla's, one could not move the cockpit levers to full power and have the seat shoulder harness done up at the same time. Man/machine interfacing was not at its best in the Sunderland.



The “Bridge”

So we move from the bridge down the steps to the bow. Here one had to bend double, but in this compartment there were many purposeful things. A hand-held fog bell, an anchor, the anchor winch - and an axe, allegedly there to cut through the anchor chain in an emergency. How it might be swung effectively in the confined space was never explained; and those who had tried found also that its blade was no match for the steel of the chain. It simply bounced off, not without risk to the shins of its wielder as it did so. There was also a bollard for mooring. It was stowable, under the front turret. The turret itself was retractable, by a hand winch mounted in the roof. Wound back, this enabled the bowman to mount the bollard and to stand in the bow to catch the buoy or release from it.

Just aft of the bow compartment, on the starboard side and down a step, was the toilet. This had a header tank which was filled with sea water. In the air the contents of the bowl were simply discharged overboard by hand pump, raw into the environment without benefit of millepore filters

or other treatment. Needless to say there were rules about where it was used, and certainly not until the machine was in airborne motion as it were. Furthermore, once airborne there was no means of re-charging the tank with water, so careful economy was the rule of the day.

SUNDERLAND ON PATROL, NINETEEN FIFTYSOMETHING. PART 2

Let us return to our crew whom we had left beginning their pre-flight checks.

The specialist aircrews go to their specialist tasks and the captain to lordly consideration of the horizon, leaving the co-pilot to do the rest. He begins in the bow, checking security and the readiness of the equipment and the state of the bilges. He should not forget to charge the toilet header tank, for he would get no thanks later in the day if he neglects that task. He also checks under the floorboards to ensure the spare drogue is safely stowed, and that there is no excess water slopping around in the bilges. Finally he checks the hand-operated portable bilge pump (this item could be critical, but mainly because the power pump driven by the auxiliary power unit in the starboard wing root was notoriously unreliable. It was susceptible to the induction of muck, of which there was usually plenty in the bilges. As it clogged up in a matter of minutes it lost its suck. The hand-operated pump was efficient, but had been designed with the working stroke on the pull not the push, which presented its own set of problems when trying to use it bent double in the bow compartment in particular.

Then aft through the wardroom to the galley, checking the swash doors are properly dogged on the way. All equipment in place and secure - the second signaller is unlimbering the rations. The copilot looks out under each wing. This is not, as some say, to prove he can count up to two, but rather to look for telltale engine oil or fuel leak stains; or inspection panels left open.

To the bomb room. Here he checks that the bomb doors are properly closed but the releases are engaged and cocked. He tests the manual overrides, re-cocks the mechanisms and then checks that the motive bungees are properly in place. He also checks out the bomb racks, not forgetting the safety pins if there is any live ordnance aboard.

Aft through the crew compartment to the sloping deck up to the tail, checking the after door and the leak stoppers nearby. Here he does lift the floorboards to check the bilges punctiliously. The problem is not that the hull is prone to leak from the sea at this point any more than anywhere else. The aircraft is waterproof underneath for obvious reasons. Less attention was paid to waterproofing it from above, however. (This could have consequences when flying in freezing conditions in rain. The flight deck could flood and the flood turn to ice, as sometimes happened in the winter during regular air bridge sorties from Wellington to the Chatham Islands at the behest of Norman Kirk, then Member for Lyttelton.)

The particular concern with the rear compartment is that it is well aft of the centre of gravity. Rainwater does tend to collect here. Any water in the after bilge will slosh further aft during takeoff and, at one kilogram per litre, could upset the balance of the aircraft beyond the authority of the flying controls to counter. It is not a good time to discover this under full power as the aircraft rears nose skyward to lift onto the “step” during the takeoff run in an attempt to get airborne well before the physics of airflow say it is time.

Then back to the tail in increasingly cramped space. Control runs free and clear, emergency broomstick in place, rear turret aligned fore-and-aft and locked. (Momentarily our co-pilot reflects with satisfaction that he did not swallow the story, as some had done, that the manufacturer finished the build of the aircraft by popping in a special last rivet in the tail, in a place which could

only be seen by craning over the edge of the turret from a precarious and undignified position. The Legend of the Golden Rivet had taken in many less sceptical souls. It had resulted in much unkind hilarity on the part of the perpetrators, and inelegant embarrassment on the part of their victim, when the latter got caught surreptitiously prospecting for gold.)

The copilot again moves forward, up over the gun platforms onto the deck with the wave guide switch, checking hatches and equipment. He manoeuvres through the small door onto the flight deck and advances to the lookout hatchway. He climbs up and out. The surface is damp with morning dew, and greasy with a residue sheen of oil, fuel and seagull shit. Overhead are the wires of the HF aerials strung from the "goalposts" just behind the hatch to the extremities of the airframe. The copilot must now walk the wings to check bits and pieces, and he knows what it must have been like to walk the plank. But that is the easy part. He must also walk the length of the top of the fuselage, which is not too bad though the footing narrows toward the rear. The difficult bit is negotiating the vertical fin to get onto the horizontal tailplane. There is neither hand hold nor foot hold. The surfaces are smooth, and slippery.

The geometry requires that to get around the leading edge of the fin he must lean outward slightly, contrary to his instincts some twelve feet or so above the moving ripple on the water, and step onto a sloping curved part of the fuselage before lifting the other foot around the fin and planting it on the upper surface of the stabilizer. Having inspected the elevator, he must then detach his attention from the balancing references around him and throw his head back to look up at the tall rudder towering high above. Finally he must retrace his steps and repeat the procedure on the other side of the fin and the other stabilizer.

For these high-wire activities the canny co-pilot never failed to keep an eye on the jokers who might lurk among an otherwise trustworthy crew. The Sunderland's wing floats were designed so that only one touched the water at once, while the other hung clear. Factors such as fuel loading - the fuel was in tanks in the wings - and wind direction defined which of the two was in the water, and the aircraft leaned over that way when at rest. But the weight of a man on a wing could turn the balance the other way, and the aircraft would roll to dip the opposite float. The actual angular change was only a few degrees, but when precariously balanced on one foot in mid-step around the fin, those few degrees were a lot if the change came unexpectedly. The sport of trying to cause the copilot to fall off the tail by rocking the aircraft in this way was frowned upon by officialdom, but was one of those things impossible to stamp out.

The pre-flight complete, the chant of the pre-starting checklist begins, with challenges and

responses from throughout the aircraft on intercom. Hatches secure, fuel tanks selected, bowman ready, throttle and pitch exactors primed, vicinity clear. By this time the bowman has retrieved the mooring strop from the eyebolt on the keelson under the nose, looped a painter from the bollard through the upper cage of the buoy and taken a turn back around the bollard. Clear and ready.

Start the inner engines first, normally beginning with Number Two on the port side, then Number Three. The Pratt and Whitney R1830-90D Twin Wasps turn over, cough and splutter into life. Their idling speed is set much lower than in the case of land-plane installations. This runs against the grain of conventional airmanship, because aero engines are fine tools which prefer operating under load.

One is taught to avoid idling piston engines unnecessarily on the ground at other than the minimum rpm defined by their maker, which is usually at a throttle setting above the minimum stop. But even at the reduced engine idle speed in a Sunderland the propellers bite well enough to run the aircraft up against the buoy and tension the mooring. Consequently the engines can be hard to start, because the throttles cannot be cracked too far open for fear of a sudden burst of power ripping the aircraft from its moorings, or even the moorings from the sea floor. Hence the elaboration of the spark boost and priming pump controls in the lookout panel. And at the unusually low idling speed, sometimes the engines simply die as the spark plugs oil up. Naturally enough this tends to happen when they are most needed; it is one of the rules of aviation, written by Sod as his Law.

With the two engines ticking over the mooring is slipped before the outers are started. This sometimes requires smart work in confined areas. Asymmetric power applied to the inners will help turn the aircraft but the turning moment is not great and the power needed also accelerates the aircraft forward. The outers have a greater turning moment, and so can induce a turn without so much power and forward impulse. So they may need to be started quite quickly once the buoy is slipped. Moreover, when they start it may be necessary to break yet another land-plane rule by running them up to highish power as soon as they fire, well before they are warmed up, simply in order to get the water turn going.

The aircraft now noses out into the channel as the mooring crew tidies away the ropes and other equipment, and extends the front turret into place. In known waters the leadline is not needed, though the crew has passed interminable examinations involving arcane calls such as "by the mark five" or "by the deep six", not to mention the meaning of a piece of leather with a hole in it. They also need to know the difference between under way and making way on the water; what one, two or three blasts on a siren may mean; how to recognise a port-hand marker from a starboard-hand marker; and who has the right of way when a flying boat and a yacht are on converging courses.

Another thing one cannot do in a flying boat is run up the engines to test whilst tethered to the buoy. The mooring gear wouldn't stand it. Since there are no brakes once slipped from the buoy, it must be done on the move. Nor can it be done one engine at a time, because the aircraft would simply pirouette and probably break off a float. But it cannot be done all four at a time either, because the machine would get airborne. So it is done two at a time, symmetrically. Moreover, because it is not a short procedure much of the available takeoff run will be consumed in the process. This requires some forethought. If, for example, one were to run up a pair of engines heading downwind, and the other pair into wind, one would then be at the wrong end of the seaway for takeoff. So there is a lot of manoeuvring to be done between slipping the buoy and the takeoff and, though it might look aimless to the observer, it all has a purpose.

Our crew accomplishes all this, and is ready for takeoff. The trims are set - elevator two-and-a-half divisions nose up, rudder one-and-a-half divisions right. Mixtures full rich. Pitch controls full fine. Fuel tanks "twos and fives selected"; this from the engineer. Flaps one-third.

Off we go, steering with asymmetric throttle initially; there is no other way. The seat shoulder harness is necessarily discarded, for the reason mentioned above. As speed is gathered the rudder begins to gain effect, and the throttles can be advanced in unison to flat chat. Both hands on the yoke; the copilot now holding the throttles. The downside wing can be picked up (and better be, lest the float digs in). The nose comes up sharply initially and spray breaks over the front, but it lowers again as the hull lurches up onto the "step" and planes along with sharply reduced water drag. The spray plume is now left behind but is still spectacular.

Folklore has it that seaplanes sometimes fail to get up on the step. The writer experienced this only once in over 2,500 flying hours in Sunderlands. It was in Manila Bay, in the middle of the night, with a significant cross wind from the right, hot as hell, and laden with technical crew and their duty-free goodies after a long SEATO exercise based in Singapore. We started the run, and laboured on and on with the nose locked high, well short of reaching the planing step. The engines did their best, but it was a lost cause. We closed the throttles as the end of the seaway loomed up, to find that the control launch had kept handy pace with us throughout the run. We taxied back to try again. This time we took advantage of the width of the marked seaway and angled across it more into the wind. We were also fractionally lighter by the amount of the fuel we had burned in the first attempt. We got airborne, just, and then had an interminable time clawing for altitude.

No doubt this could be taken to add to the legend that "boats" sometimes refused to climb up onto the step. But I have to disappoint those who might see an ineffable mystery in it. The problem in our case was much more ordinary and certainly more explainable than dancing to Neptune's cranky moods. It was a matter of power. Without brakes or wheeled contact with a firm runway to help keep the beast from careening off the marked seaway, we had not been able to get enough way on to give rudder control to hold the direction against the wind. Unable to advance the left outer throttle in the crosswind, we were trying to beat the air into submission using only three-quarters of the available power. The air won. (As an aside, the P & W Twin Wasps each delivered about 1,200 horsepower flat out; 4,800 hp in all for the four. For the sake of perspective, each of the Allison turbine engines in the C130 Hercules delivers about as much as the four Twin Wasps combined.)

There is another legend, to the effect that once on the step some conditions of calm water could cause the hull to stick to the water – capricious Neptune again. This never happened to me, nor to any others I knew, in a Sunderland. Takeoff runs might be longer in glassy calm conditions, but only because there was no wind, not because the hull sucked.

While we are about straightening the record, there is this. Flying boats and their smaller cousins seaplanes do not provide limitless opportunities of using the most available landing surfaces in the world. They are, in fact, very limited in that regard. They need sheltered water. They need boats and barges to tend them. There could be no such thing as a convenient terminal air bridge for passengers

to board them. And husbanding them and their engines against the corrosive ravages of salt water on high-technology alloyed metals is a costly business.

But their biggest enemy is the nature of the surface they are designed to operate from. The sea moves, sometimes in big waves and swells. The problem is that water is incompressible. If one hits water hard in the wrong attitude it is not the water that gives, it's what hits it, as anyone who has belly-flopped off the high board will know.

Landing a flying boat in high seas has obvious risks. But taking it off in such conditions can present a greater peril. Riding the swells at rest may be possible, if disconcerting. But at some point in a takeoff run the aircraft will crest a swell and be thrown off the top at less than flying speed under full engine power. One thing is then inevitable. Unable to fly, the machine will hit the face of the next swell, or the next after that. Then other things will happen. If the speed is not high enough to permit some kind of aerodynamic control, the aircraft will likely hit the water in a skewed attitude and break up or roll over on impact. Or, if directional and lateral control is maintained and the aircraft hits straight on, it will either dig the nose in and drive under, or be thrown off again to repeat the process in a porpoising action until that result - or the alternative wing-down cartwheel - is finally achieved. Neptune will feed; or if not he then the sharks, and feeding passengers to the sharks would not be an image in the interests of the airline business.

SUNDERLAND ON PATROL, NINETEEN FIFTYSOMETHING. PART 3

Our Sunderland has finally lifted off from its base into its other element. After some minutes it reaches the assigned cruising altitude, usually no more than 5,000 feet, and settles down into level flight. The crew sets economical cruising power, mixture auto lean. This can result in another contradiction between theory and practice. The most economical speed in an aircraft is, among other things, a function of all-up weight. At higher weights the best speed is higher than at lower weights. In slow-flying low-altitude petrol-engined propeller aircraft, the relative change as fuel is burned can be quite significant. In some cases, however, of which the Sunderland was one, the maximum power available in the economy range could not reach the best airspeed at the higher weights. There was no trade-off; moving the mixture levers to richer settings in order to apply higher power to maintain the best speed simply used disproportionately more fuel. Sunderland crews were therefore inured to the indignity of wallowing through the air at the speed of a stately airborne galleon - about 112 knots - in lean engine settings at the beginning of a sortie when the best speed was unachievably in excess of 130 knots. At some point in the flight, usually hours out, the best speed would have reduced as the weight reduced, and at the same time the fixed power setting would be able to drive the lighter aircraft slightly faster. At this point of happy coincidence the power could finally be reduced.

The crew proceeds, looking forward to that moment. The flight is routine. The ocean is large. Most crew members fight off boredom, except for the second signaller slaving in the galley, for whom the opportunity of boredom would be a relief.

The ennui is punctuated from time to time by radar contacts which have to be investigated - ships, yachts, floating debris, changes in the surface texture of the sea - until the radar goes "down". Quite outside the rules, the radar man - a signaller - figures he can fix it. There is a blown resistor, he thinks. (The ASV Mark 6C radar was an adaptation of the H2S bombing system developed by the RAF during the Second World War to enable navigation and blind bombing over Germany. It was an agglomeration of thermionic valves, switches and resistors. Neither transistors nor integrated circuit boards - indeed, our crew is operating at a time when one of the things coveted as a purchase on

overseas trips was an ordinary transistor radio, then a modern marvel. Before mass production, however, the price was still considerable and seldom within the range of the parsimonious duty-free allowances of the day.)

Our signaller elbows the galley man aside, and with spoons heated in the flame of the Primus stoves manages to unsolder the offending resistor and replace it. It works.

But how to mollify the holder of the inventory of spoons for their ruin in the process? Easy. One of the advantages of flying boats were the marvellous means they provided for inventory adjustment: "... it slipped from my grasp, Sir, and went into the tide ..." To give the proposition some kind of veracity the event was usually underlined at the time by a comment like "...*#@%, Captain, I just dropped the spanner ..." as the aircraft taxied up the channel to its moorings. Far be it from the writer to imply that there were dishonest aircrew who acquired private toolkits by this means, for it was not the case. Nonetheless, things did get lost. And if all of the tales are to be believed, there is a carpet of tools, cutlery and other paraphernalia bearing the Government arrow to be found on the floor of the harbour bases at Hobsonville and at Laucala Bay in Suva.

With the radar back in operation the patrol continues. The navigator wants to "shoot the sun" with his sextant. This could induce an argument. One of the problems with astro-navigation with a handheld sextant is the stability of the platform. Because of this the aeronautical sextant shoots the heavenly body repetitively over a period of about two minutes, and averages the shots. The precision will depend upon how accurately the aircraft is held straight and level for the duration of the shot. Some pilots were convinced they could do this better than the autopilot - and in a Sunderland it could well have been true - but most navigators were convinced they could not. Hence the argument. And hence the recriminations when the shot failed to reduce to a useful answer.

There were other occasional tensions among crew categories. Another means available to navigators to navigate was to measure the wind regularly in order to calculate its effects on the path of the aircraft over the sea. The methods were generally only available at low altitudes. Today such techniques are irrelevant by virtue of inertial or other high-technology navigation systems; but then we all relied upon hand-cranked methods and the sweat of flesh-and-blood navigators.

Several options were available. The simplest was to apply a navigating eye to the drift sight, with its graticule of parallel lines which could be aligned to track the whitecaps below to read off the angle of drift on the bezel. Another was to throw out a smoke float and track it from the rear turret to obtain the angle of drift. A third was the three-course wind. This involved flying accurately on course for a period, then on a sixty degree diverging course for a similar period, and finally on a sixty degree converging course. The drift effects would be averaged and an accurate wind calculated. The problem was that it disturbed the even tenor of the flight. Boredom can breed laziness, and pilots resented the chore. If the radar man called a contact during the evolution, causing it to be disrupted, the signallers would also go down in the black books of the navigator.

These were not the only sources of sometime testiness. Boundaries of responsibility were to be jealously protected. The geometry of the flight deck was such that the navigator sat in line with the propellers. If their RPMs were not properly synchronised there developed an annoying asynchronous beat. The distraction was more marked where the navigator sat than where the pilots sat. The Sunderland had no modern concession such as an engine speed interlock which kept matters in synch. It was done by hand, using minute adjustments to the pitch levers whilst looking through the plane of the inner propeller to the outer, and arranging that the strobing shadow of the one as seen through the other was stationary. That was fine for each of the pairs of the engines per wing, but it could not be used to match the pairs one to the other. Hence there tended to be a lot of fiddling

with the pitch levers, which were low and aft on the pedestal between the pilots. Surreptitious navigator hands have been known to creep forward to add to the fiddling.

The remedy to contain this gross breach of demarcation was also known. The pilot, should he wish to do so, could resort to waiting for the intrusion. He could then casually allow his hand to drop between the seats. The touch of hands was usually enough to make the point. In particularly persistent cases the cure could be given sharp emphasis if the hand of the pilot held a lighted cigarette; "I'm terribly sorry, navigator, did I burn you? I didn't know you were there!"

Navigators also had their gripes about pilots. Some pilots never fathomed the navigational arts, and mistrusted them from a position of ignorance. Some had themselves been navigators now "retreaded"as pilots, and mistrusted other navigators from a position of knowledge. Whatever, navigators resented having pilots lean across the navigation table poring over the charts and calculations in detail and asking why this, why that? Some navigators not only resented it, but were driven to fury by it. Again there was a range of remedy, starting with studied ignore and graduating up through a polite request to desist, to a direct demand to bugger off. But by far the most drastic remedy known to the writer - by unverified repute only, for he was not involved – is said to have occurred during a tense flight at night in bad weather. The pilot had got out of his seat and had persisted in craning over the navigator, watching him closely. The pilot's hand was spread palm down on the plotting table. With a movement so fast to deceive the eye in the dark, the hand was pinned to the table by the points of the navigator's dividers. Whether this story was true or not scarcely mattered. For young pilots to whom it was told the message was clear - do not mess with the navigator.

Another interlude giving meaning to life is mealtime. The signaller has been slaving away at the Primases (or should that be Prime? Let's settle for “the signaller is slaving away at the Primus and has the other one going as well”).

There is a kind of inversion of the law of diminishing returns in using such primitive equipment. It is surprising how much it concentrates attention on producing basic quality, as distinct from producing mere fripperies in the hope of disguising poor quality by dressing it up. So it was with the cuisine aboard Sunderland’s. Delicious, nutritious and generous, its quality transcended the nature of the equipment used to produce it.

Even where embellishments above the basics were available, the result did not always rise to the sum of the parts. Graham Kerr (pronounced "Care"), later to achieve fame as the Galloping Gourmet with his own TV cook show, was at one time the Air Force's catering officer. He showed often enough that the primitive equipment was no barrier to producing cordon-bleu class meals. He never quite understood, however, that at three o'clock in the morning on a black night over the Pacific Ocean, crews preferred steak, eggs and chips over his culinary artistry.

As the sortie approaches its end the activity rate rises. From the wild free wastes of the ocean, the aircraft noses back toward civilisation. The crew is tired, but digs down to find concentration. There are air traffic rules and even air traffic; and there are chores to be done. Finally, at some point it will be necessary to bring this thing back safely to the surface.

It is getting dark. The flarepath is laid out, but it is not the double line of bright lights of a land runway. The control launch has laid a single line of small buoys, each with a pathetically dim battery powered light on the top. There are only five or so of them, spread out over the length of the seaway, with an additional one at each end displaced to show the opening and closing gates. Everywhere else there is blackness - there is nothing as black as the sea in the dark.

How does one alight in such conditions? During the day the routine is much as for landplanes - an approach at the right speeds and angle, followed by a judged round-out and settling onto the water. At night - or in smooth water conditions in daylight - the surface cannot be seen reliably. One therefore sets up a rate of descent on the instruments - about 200 to 300 feet per minute - and aims just past the opening gate, and waits. The aircraft flops on, lurches, not infrequently leaves the water again, and finally runs true on the surface. One does not close the throttles at the first touch, however, but waits for the second. If in obedience to the rules of Isaac Newton the machine has lifted clear of the water at the first touch unbeknown to the pilot, it might not take kindly to the return if unpowered. So the engine power is left on just in case, and on the second lurch is cut back.

On this occasion the captain has given the copilot a challenge. He called "engine failure" on the port outer as the aircraft approached the base, and cut that engine dead. The copilot feathered the propeller and cleaned up for an asymmetric approach. He is obliged to use rudder to counter the yaw, and aileron to hold up the wing - both of these demands requiring not a little strength, for the Sunderland had no refinements such as power assisted controls.

On the approach he sets the flaps. The Sunderland's Fowler flaps were enormous, and the full extension was used only for "sailing" the aircraft on the water. The normal settings were one-third extension for takeoff and two-thirds extension for landing. A lack of design refinement showed here too, however. The flap actuator was electrical, controlled by a switch on the instrument panel. It was not simply a matter of demanding a flap setting and getting it; the pilot had to operate the switch to cause the flaps to run out, then to cancel the switch when they reached the desired position.

Our copilot goes for one-third flap at the appropriate moment, and remembers to stop the travel at one third. Later in the approach he goes for the two-thirds setting but is distracted by the need to maintain rate of descent and direction with the heavy controls and the engine out. The extra drag requires extra power on the three working engines. More rudder, more aileron. It is becoming a bit of a struggle, and the copilot complains. The captain remarks without sympathy that he will find out why in a minute, as the aircraft approaches touchdown. It splashes on, hard, and bounces. The second bounce is almost as hard, and the copilot delays throttle closure until the third contact. By that time he realises his mistake - the flap has run out to full, and acted like a sail as intended. The aircraft is down safely, but he can do nothing to soften the remark of the captain that he is a bloody fool, because it is true.

The captain chooses to emphasise his point by calling on intercom "Practice broken float, broken float, starboard, starboard - GO!" The lookout undogs the astro hatch and launches himself through, trailing a rope which is ready to hand and attached at its inner end to a structural fixture. Other crew members drop everything and follow. The lookout races to the tip of the starboard wing; the rest come after him, using the rope to steady their progress. The idea is that if the port float (in this case) was broken the crew would get out there in time to weigh the other wing down and prevent the aircraft turning turtle.

With the crew recovered inboard again, the aircraft taxies in past the lead lights and channel markers. The lookout uses the Aldis lamp from the hatch to find the mooring buoy. The tide is running full rip, the wind is in the opposite direction, the channel is narrow. Do we approach into wind and down tide, or into tide and downwind? A vexing compromise; on the one hand the directional control will be easier but the speed of the waterborne approach will be high, and on the other hand directional control will be more difficult downwind, but the rate of approach will be gentler into the tide. It is a familiar conundrum, often argued about but seldom soluble by rote. The pilot opts for down tide, into wind, with the flaps properly used at full extension this time.

The aircraft is controllable direction-wise, but is being carried fast by the tide. The water drogues are no use; indeed to deploy them would only add to the speed problem. The bowman catches the cage of the buoy with the painter, and loops it to the bollard. Wisely, the pilot does not yet cut the engines just in case. The aircraft carries forward in the tide, the mooring tensions and the rope slips off the bollard with a twang. Go around.

This time the approach is downwind, into tide. The drogues are deployed. The flaps are retracted; no point in adding their effect to the tailwind. The air rudder and the ailerons can still help hold direction, but are used in the reverse sense with the wind behind. The approach is more sedate, though less stable, and is successful.

The engines dead, the copilot reflects while the crew tidies to shipshape. Airmanship is a matter of alertness and informed choices. Though it is impossible to be right all of the time - and on this mooring his judgement is not in question - the consequences of wrong choices can be serious. The trick is to minimise them by good procedure and teamwork. For example, he knew that the bowman would not have looped the rope too securely over the bollard on the first approach, and would have stood clear and allowed it to slip when it became obvious the strain was higher than it should be. Too secure and the line might simply have snapped, but there had been cases where it did not and the bollard was ripped out of its mountings. Equally there had been cases where a bowman was hurt by flailing rope ends, or had had his leg caught and broken between rope and aircraft as the assembly tensioned. And he - the pilot - on this occasion had allowed for the possibility of the unexpected and had positioned himself for it by not shutting down the engines when the buoy was initially hooked.

Apart from the mistake with the flaps on approach it had all had gone well, done by well-trained people who knew their business, and what the air and the sea could do to them if they dropped their guard. The banter, the rivalries, the tautness between the aircrew professions faded to nothing in the face of the need for teamwork when all would sink or swim together - and indeed, they reinforced it. Operating a Sunderland was not easy, but it was fun, and rewarding.

Our crew now ashore and on their way home has had a working day of about fifteen hours, twelve of them airborne. Today, people think little of flying from Auckland to Los Angeles in less than that time. Forty years ago, however, our Sunderland would not have made that distance - indeed,

departing from Hobsonville on that route and with only twelve hours' fuel it would have fallen into the sea off Samoa. Times change.

Hobsonville slipway jetty and hanger

On the incident at the opening of Wellington Airport in 1959.

Go back in time to Sunday 25 October 1959. Go back in space t Wellington's new pride and joy, the virgin runway fortified at each end against the sea at Rongotai. Go back in events to the air show staged to mark the opening thereof.

The show was supposed to have been on the Saturday, but Wellington's weather was in one of its more sullen tempers on that day. The Sunday dawned better, but not much. No rain or significant cloud, but a very strong, very gusty nor' westerly gale swinging twenty degrees misaligned with the runway.

Sunderland flying-boat NZ4113 was charged with a flypast along the runway to open the show, thence to patrol Cook Strait as search-and-rescue picket for the rest of the afternoon (inelegantly, the callsign assigned for the latter purpose was Duckbutt).

My log book reads copilot and, with tactful understatement, records the Manoeuvre as "Touch and Go, Rongotai". The planing hull was breached in the process. Having become a casualty itself, the aircraft was obliged to abandon the duckbutt duty in favour of a duckscuttle back home to Hobsonville.

But before turning to the detail, let me mention the aircraft immediately following us in the programme, a Royal Air Force Vulcan, tail number XH498. On approach from the south in the tumultuous wind this aircraft hit the lip of the runway where it falls away into the sea. One undercarriage leg broke at its root. Though it remained attached to the aircraft it was free to flap in the breeze - and did. Fuel lines were ruptured, releasing turbine kerosene to spray everywhere as the aircraft climbed away. The hapless machine landed at Ohakea. As expected the damaged leg collapsed during the runout. The aircraft slewed off the runway on one wheel and the other wingtip, ploughing up the turf before coming safely to rest. It was repaired at Ohakea over the next several months, and eventually was flown back to Britain.

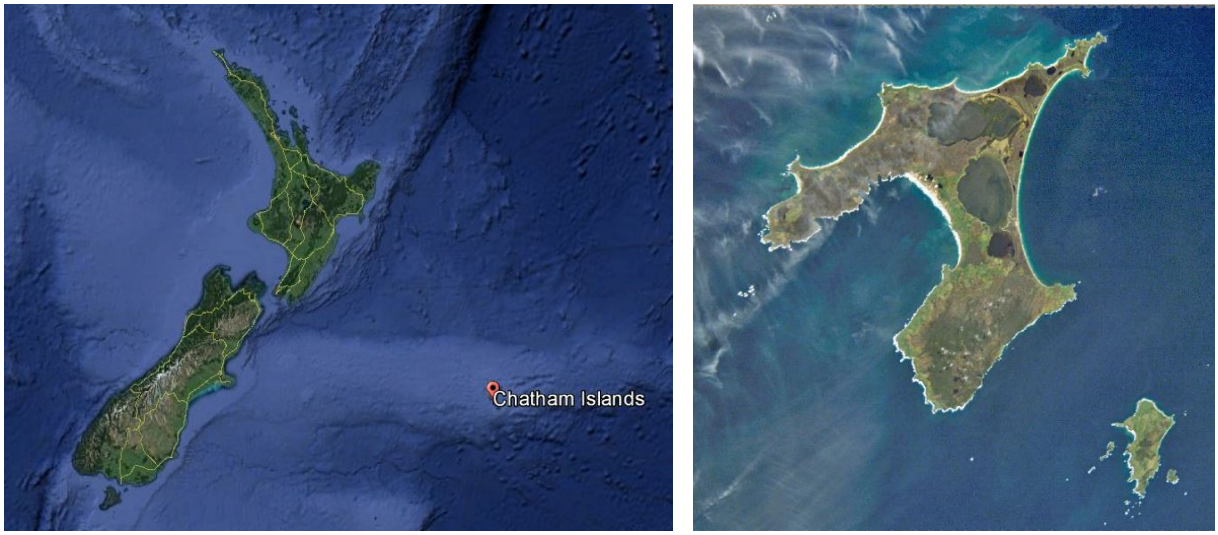
Some show. Some opening. Double whammy.

As the Sunderland sullied the spotless new seal, the sensation from the cockpit was just a brief couple of mild bumps - rather like a car negotiating a double speed hump. From the lower deck, however, the sandpapering noises were louder, more prolonged, and much more alarming.

The hole was a couple of feet long or thereabouts and about half that in width. It was big enough to be a worry, shaped like an isosceles triangle with the pointy end forward. Trapped bilge water sprayed out. The lowest point of the keel, right at the "step" in the planning surface, had been ground away. The void was at a junction of several compound curves in the frames and aircraft skin, and was both too large and too irregular to plug satisfactorily in the air. (It was also abitch to repair later.)

As it happened, the aircraft was rigged for a return passenger run to the Chathams. At the time, these flights plied about once a month between Evans Bay and the Te Whanga Lagoon by direction of the Government; the Member for Lyttelton (which included the Chathams) was the burly, bluff and highly engaging Norman Kirk. For students of the history of the New Zealand coastal shipping trade, these flights were conducted under charter to the then famed Holm Shipping Company.

The substantial land airfield that's now near Waitangi came later.



Chathams

Meantime the Sunderlands provided an air bridge. (As an aside, a couple of weeks or so after the events related here we lost a Sunderland in the lagoon. Whilst taxying where it was thought to be safe on the line of the lead-in markers, there was an argument with a

submerged and uncharted rock. The rock won. There were no casualties but the aircraft was kaput; sunk; gone to Davy Jones.)

The Sunderland after hitting a rock in Te Whanga Lagoon in 1959. Behind is the plane sent to rescue passengers and crew.

The Sunderland after hitting a rock in Te Whanga Lagoon in 1959.Behind is the plane sent to rescue passengers and crew.

The significance of the Chathams rig in the context of the runway touchdown was that the wardroom and another compartment further aft were converted for passengers. Ordinary airliner seats were installed. Needs must; their squabs were put to a use their designer could never have intended nor even envisaged. They were stuffed into the hole and shored into place from the inside. The array of rubber leak stoppers, coir mats and Plasticene (yes) that the Sunderland carried for such eventualities were unequal to the occasion.

The flight engineer who accomplished this work during the flight back to Hobsonville was later decorated for his troubles. To do it he had hung precariously for hours by his heels - literally - from the decking support cross-members, upside down in the bilges, packing whatever was to hand into the hole and surrounds. It wasn't sufficient only to try to reduce the inflow of water that was inevitable when the aircraft touched down on the seaway at Hobsonville. What could not be assessed with confidence was the possibility that the hydraulic force of the water on touchdown at 80 knots might rip the weakened structure wide open. Thus the engineer had to do whatever he could to shore it all up.

The duty crew at Hobsonville and anyone else who happened to be standing around on that Sunday were called out. Several seaplane tenders - flat-bottomed barges with lowish freeboard - were prepared. Aboard was the beaching gear and high-capacity powered Climax water pumps. The beaching gear was a pair of wheeled bogies mounted on substantial girders that fitted onto a hard point in the armpit of each wing and were then snibbed to the

respective side of the fuselage. There were no modern labour-saving devices or other niceties to this. Heavy push-me-pull-you functionality was the watchword.

When fitted the wheels projected below the lowest point of the hull so the aircraft could be winched up the slipway. They were hauled up the ramp backwards by a wire hawser bolted through a ring under the tail. As they rose out of the water onto land in such an undignified manner the persona of these great things, whose elegance in either of the two elements for which they were designed was unsurpassed, seemed invariably to shrink into embarrassment.

The Sunderland carried two water pumps as part of its standard internal kit. One was powered by the auxiliary power unit (APU), a small petrol engine that lived in the starboard leading-edge wing root. The other was a hand pump stowed in the bow compartment. The latter looked like a vehicle tyre pump, except that the working stroke was the pull not the push. It was exceedingly hard work. For other than the most trivial of tasks, using it called for approximately the same optimism as baling out Lake Taupo with a bucket.

The APU pump was scarcely any better. The APU could not be started until the aircraft came to rest because its housing in the wing root had to be opened from the outside to allow the engine to breathe and the exhaust to escape overboard. To accomplish that task one had to climb out of a hatch in the fuselage roof, step from the curved top surface of the fuselage onto the wing, undo the Dzus fasteners that held everything closed, and open the hatch in the leading edge; all of this proximate to the inboard engine nacelle and propeller. It was not a manoeuvre to be recommended if the aircraft was in significant motion including lumpiness in the seaway - unless of course one wished to go swimming involuntarily (having taken one's chances through the propeller arc).

The capacity of the APU pump was greater than the hand pump of course, but its reliability was awful. Bilge water generally is not pretty stuff. Not only does it smell bad, but to varying degrees it accumulates oil and other contaminants, both fluid and solid. To protect the pump mechanism (and the APU itself from overload, for it had other uses) the associated plumbing was filtered. The filters choked quickly on a diet of bilge soup. Memory dims a little, but recollection is that two or three minutes was a respectable run; five minutes or ten was exceptional.

Out of these considerations, prudence called for the supplementary barge-mounted Climax pumps to be available. This was high-capacity equipment, in the class of the average fire hose. The units had been started and tested ashore before the aircraft alighted. All was as ready as it was likely to be.

The aircraft touched down in the channel. The hull was not further breached. But the water did come in - and fast.

Then intervened Sod's Law. Not Murphy's; Sod's. The two are different, though often they are confused with each other. In aviation at least, Murphy states that if any important component is designed with the potential to be assembled wrongly, someone someday will manage to gratify the potential. Sod is simpler; if something can go wrong, it will.

The plan was that the supplementary pumps would at least hold the flow while the beaching gear was strapped on. It should have worked. What went wrong, however, was that the

Climax pumps so recently tested would not start. The onboard APU pump quickly expired, as expected - it could not cope with the flow anyway. The hand pump was useless. The aircraft started to sink.

The space beneath the lower deck of a Sunderland - the bilge – was compartmentalised into watertight sections. The deck itself, however, was close to or below the static waterline. Above the deck in the doorways between compartments, therefore, and aligned with the lateral bulkheads beneath the decking, there were low doors that could be dogged shut. Called swash doors, they stood three feet or so high, and they carried the watertight compartmentalisation on up to the level of their tops.

On this occasion the waters rose inside and began to lap over the swash doors. Re-starting the main engines and simply running the aircraft onto the mud flats under power started to become a serious option.

Then one of the Climaxes cleared its throat and decided to behave; then another. With the whole interior now awash to well above the tops of the swash doors, these pumps were able to stabilise the water level.

Now came a final difficulty. The aircraft of course had settled well down. Both wing floats were in the water. Indeed their buoyancy was helping prevent matters getting worse. The hull was now so low, however, that the very high buoyancy of the big pneumatic tyres made it impossible to force the beaching gear far enough under the surface to engage the tops of the legs into the sockets under the wings.

So, further delay ensued while air was let out of the tyres. Eventually the aircraft was inched up the slipway on the rims of the wheels, which became easier and easier as the goodly part of the inner harbour then inside the aircraft spilled out of the hole through which it had entered. No fish, though.

Some air show indeed .....

Most tales have a moral, and this one is no exception. It is not a tale cautionary about Tail Number 13, however. Nor is it that landing a seaplane on a runway is a bad idea - which is not a moral but a self-evident truth.

The real moral is about plans. The train of events after the touchdown suggests there is another rule that ranks alongside Murphy and Sod. No matter how well-conceived a plan may be to take us from the known to the unknown, expecting its execution from start to finish to follow the pattern prescribed for it is the really bad idea. The best any plan can do is provide

a point for considered departure when the unexpected happens, as happen it will. A larger Lesson for Life, perhaps?

In a nutshell, stay flexible.

The incident at Tarawa, among other things:
(TALES OF THE SOUTH? PACIFIC)

Sunderland NZ4117 turned onto final approach to land to the east on the lagoon at Tarawa. The aim was to alight just past the main islet of Betio and parallel to its neighbour Bairiki. The flight from Laucala Bay had been indirect, the aircraft having been tasked to patrol enroute. At the time of arrival in the late afternoon of 15 April 1961 fuel was getting low. The aircraft had reserves, but was not going anywhere except the lagoon right there, nor at anytime except right now.

But there was a problem. The machine had arrived just as a serious tropical line squall hit the atoll. These things can be of great fury but are normally of short duration. But this one had hung around, delaying the landing. Eventually it abated a little and, although the water was still very rough, the captain decided the time had come.

The lagoon at Tarawa is large, but is reasonably shallow and sheltered particularly from the east, so open-sea swell was not a problem. Because it is so large and the islet periphery so low-lying, however, there is ample fetch for the wind to whip up a significant short-period steep-sided wave train inside the reef. And so it was on this day.

There was no risk of being thrown off the surface by a swell. But, coming the other way at the critical moment, the aircraft met a large, steep-sided wave. Whack – as I've said elsewhere, water is less compressible than dirt.

I was one of three pilots aboard that day, and was standing in the lookout position at the astrodome in the roof. There were no such niceties as being strapped in; the lookout just stood there completely unrestrained. When the aircraft struck, it struck hard enough for me to jump down from the two-foot high platform and look for somewhere to go. Slightly forward and to the right, the navigator had been sitting at his station, task done, waiting for touchdown. On impact he, too, decided he wanted to be somewhere else, and stood up. The result was that we both tried to occupy the same space at the same time, which didn't work.

While we sorted that out the aircraft ploughed on, bucking energetically in the chop. Then it began to sink quite quickly. The keelson had broken under the bow compartment. The planing hull was breached.

The water remained very rough. The break in the keelson could not be dealt with from the inside, and there was no prospect of inspecting the damage or of doing anything about it from the outside until the aircraft was securely moored. Meantime, water was coming into the bow compartment through the break at a great rate.

The APU pump had, as expected, worked briefly and then choked. It was useless. The hand pump could not keep pace with the inflow, though it continued to be used to reduce the effects. This had to be done in relays by crewmembers.

The working stroke on the hand pump was the upstroke - its design assumed an upright stance and the use of the major muscle groups in the back. But it was not possible to stand upright in the bow compartment. Cramped and stooped under the low deck-head, the heavy

pull stroke fell to the triceps alone, arms akimbo. With the aircraft still not moored and heaving in the sea, in the confined space and in the enervating temperatures to be expected in equatorial conditions, those doing this heavy work soon succumbed to seasickness. They had no choice but to continue knee-deep in sea water in which now floated their own vomit, and which threatened to spill over the isolating bulkheads into the rearward compartments. This was tenacious stuff, some might say heroic, but it was as much expected of crews as it was necessary. And this crew did have a vested interest!

When the aircraft was finally moored and the squall had subsided, crew members dived over the side to inspect the damage from the outside. After making an impression of the breach with a large piece of Plasticine they reduced the rate of the leak for the time being with coir mats. Then they constructed a plaster-of-Paris mould from the Plasticine former. Finally they melted a (considerable) quantity of solder and formed it using this mould. When it solidified the metal was bolted to the damaged area finally to stop the leak altogether. For the record, a couple of weeks later the recovery crew had shored up the weakened area with timber from the inside, and NZ4117 made it back to Laucala Bay under its own steam for permanent repair. (Since writing this I have found that the aircraft was not repaired, but was written off at Laucala Bay August 1961. My error.)

Mind you, recovery of that particular aircraft was both a priority and a worry. It was rather special, being the only one in the RNZAF fleet to be equipped with then-secret equipment known as Autolycus. This was designed to detect the diesel plume from a submarine snorkel. Obviously it was prone to false alarms as it sniffed other contaminants in the atmosphere, and its indications anyway were coarse and required refinement by other sensors. Presumably it was named for the Shakespearian rogue Autolycus in The Winter's Tale - “a good nose is requisite also, to smell out work for the other senses.” (A decade later the writer found himself using equipment of similar intent, in South Viet Nam. Named less grandly but probably more straightforwardly as “sniffer”, this kit was mounted in an Iroquois helicopter and flown at speed low – very low; right-down-dodging-treetops low – over the jungle in the early morning to sniff concentrations of human activity beneath the canopy. The wheel turns ....)

But I digress. Why were we at Tarawa anyway, Autolycus the sniffer or no?

Physically it is a large, low-lying coral atoll – reputedly the lagoon is among the largest in the world. Formerly a part of the Gilbert Islands as a British dependency, upon independence in

1979 it became a part of the Republic of Kiribati, pronounced “Kiribas”, which is a transliteration into the local language of the English “Gilberts”; the language lacks the letter “s” so it is rendered as “ti”. Far away in the east in the Line Group, the former Christmas Island, transliterated, becomes “Kiritimati”.

Kiribati does not include the former Ellice part of the Gilbert and Ellice Islands to the south – they are now Tuvalu. Nor does it include Nauru in the west, one of the “phosphate” islands, which is now an independent State. Controversially, however, it does include the other main phosphate mine, Ocean Island, now Banaba. That island is now largely derelict, most of the Banabans having been relocated to Rabi Island (pronounced “Rambi”) in Fiji after World War II, although phosphate mining did continue on Banaba until 1980.

The island groups of Kiribati sprawl over a distance of around 3,000 km east-to-west, and 2,000 km north-to-south. They straddle the Equator and bestride the International Date Line. Tarawa itself is pretty much on a line due north of New Zealand and about 1 degree 25 minutes (85 nautical miles) into the Northern Hemisphere. A common impulse to think of it as of the South Pacific could be challenged, at least technically.

At the time of our incident the RNZAF had a forward base there. Tarawa is a famous name to be sure; but the reason it is familiar to many has little to do with whether or not the RNZAF once had a base there, whether it is situated in the Gilbert Islands or the Republic of Kiribati, whether it is of the South or the North Pacific, or whether the local language spells “s” as “ti”. It was, of course, the scene of a major battle in November 1943 when the Second Marine Division (which had been based at MacKay's Crossing just outside Wellington) landed through the lagoon to wrest it from the Japanese. The tale of valour has been told many times, including the near-disastrous miscalculation of tidal conditions for the Marines' assault landing. We will therefore repeat none of this here, except to remark that the name “Tarawa” has since been borne by two ships of the US Navy, the first an aircraft carrier and the second the class-name parent of a current fleet of five amphibious assault ships.

In the 1950s and on, the RNZAF base was "activated" about once every two months or so, for a week or a fortnight, by a one- or two-aircraft detachment from Laucala Bay in Fiji. That is what our particular Sunderland was doing there – activating.

In those times the Resident Agent (of the British colonial power) was a fellow whose name looked Mediterranean but who was from an old New Zealand family in Christchurch. In keeping with the times the custom was for the visiting detachment commander to pay a call upon the Resident Agent - with all the formalities of the day including visiting cards. This had to be done. Some Somerset Maugham characters would have felt quite at home.

Usually, however, the act itself turned out to be less daunting than the prospect in contemplation beforehand. Hizzonour the Resident Agent, indelibly Kiwi, would like as not wait quietly in the residence, in ambush. When the visiting cards plopped onto the silver salver he would call "Throw yer bloody hat in, 'n' have a beer!"

The British influence went back many years. Arthur Grimes' book “A Pattern of Islands” tells it like it was in the early part of the 20th Century. Nor was our resident agent from Christchurch an anomaly. New Zealand's presence in Tarawa was quite strong from time to time.
For reasons unknown and unexplainable, in the early 1960s the local ex-pats were fond of

highland country dancing. As visitors we had to participate, at the Club. Though I come from Dunedin I had to go to a tiny, isolated part of the Pacific to be introduced to these strange Celtic capers. It is difficult to imagine a more discomposing occasion than an introduction to Scottish country dancing in sweaty heat under ceiling fans 85 miles north of the Equator drinking too much Victoria Bitter from Australia paid for with British pounds. One could almost say eccentric, the only obvious alternative being “troppo”.

Tarawa was - and one expects still is - a place of many incongruities besides colonial eccentrics and giddily transplanted rituals from cold Northern climes. On one occasion while at a loose end we explored northern parts of the extensive atoll. Tidal conditions mean that one cannot guarantee to get from islet to islet around the periphery, so the means of travel was a Gilbertese outrigger canoe. Under sail in a straight line those things go like stink, although tacking through the wind can present problems.

On a northern islet we came across a substantial building, made of brick. It turned out to be a convent school. Bold as brass, we knocked at the door, and were invited in. Inside, a number of Gilbertese girls were at that very time sitting GCE examinations written in a language not their own, and about subjects not of their society (nor, one supposes, one which they would ever be likely to know well). Curious are the effects of Empire.

The Mother Superior was an Australian. She said she had left Sydney in 1936, and had never been back. She had not even been off the atoll, except during the Japanese occupation when she had been interned on Abaiang, just to the north. Before her transhipment she had been made to watch the ritual murder of the "coast watchers" (including 17 New Zealanders) by the Japanese on Tarawa (there is now a memorial to them on the beach). When the Marines re-invaded she had heard the sounds of battle below the horizon, but did not know the result until a USN destroyer anchored off Abaiang and eventually returned her to Tarawa.

Sadly this encounter took place before the era of portable recorders, and I had not the sense to write it down immediately, so all I have now to rely upon is memory of a tale told me fifty years ago.

On the same day as we were walking through the village, a voice - not one of ours - called out "kamate, kamate". He was an elderly Gilbertese who, rather curiously, could rattle off the names of many of the railway stations on the main trunk line in the North Island. Intrigued, we probed. He said he had spent time in New Zealand between the wars as part of a labour battalion working on the railway. I was slightly sceptical of his story, but concluded I had no real reason to doubt it. He was convincing, and he did know "kamate" and all that as well as the place names on the main trunk.

Despite this experience of our ways he had trouble with the idea that I was Captain. Too youthful, he thought. In his terms the flight engineer, who was old enough to be my father, should be in charge because with age comes wisdom (he didn't know the engineer as well as I did!).

He offered us toddy, the local and potent fermented coconut brew, prepared right there in the tree. This was illegal. We pointed that out. He said who cares - only those in Betio (it's pronounced “Bay-she-oh”, emphasis on the first syllable) or Bairiki worry about what the Government says. Despite the cultural divide it seems not much was different in Tarawa from other places out of sight of governments.

On another occasion we were sent on an errand of gunboat diplomacy to fly around Nauru (or was it Ocean Is, now Banaba?), with instructions to fire our Browning point-fives into the sea to impress the natives who were restless. We based at Tarawa. We were joined by the RNZN - HMNZS Pukaki I think – which had dashed from Auckland in the middle of post-refit trials. She had made it, though panting somewhat. Wandering the reef in an idle moment I encountered a sailor who had missed the transport back to his ship. I'd been gently observing a crab, backed into a crevice in the coral waving a big fiddler claw. It was a bit pissed off, but about to become more so. He (the sailor) was hungry, he said. He picked up my friend the crab, tore off the claw and ate it right there. No seasoning, either.

The heavy coastal guns then rusting on the seaward foreshore were reputed to have been moved from Singapore by the Japanese - who had made the same mistake of having mounted them facing out to sea when the Marine attack came through the lagoon from behind. Whatever, their massive breech castings were stamped with a legend for posterity to see: "W.G. ARMSTRONG-WHITWORTH, LONDON", which isn't in Japan.

Our Base doctor at Laucala Bay said you could tell which were Japanese bones in the sand at Tarawa if you found feet with remnants of the boots, because they had a divided big toe. (He had a problem with feet, I think. Once, one of the navigators, wearing flip-flops, stubbed his toe on a lump of coral, having mis-navigated the 200 yards back to the barracks from the Club in pitch darkness after the generator was curfewed. He was bleeding quite badly, exciting the weepy self-pity of the hurting drunk. The doctor, who had also partaken improvidently at the Club, could offer no remedy except to apply his stethoscope to the site of the injury, and giggle.)

Speaking of medical matters, on a later occasion I flew the then British High Commissioner for the Western Pacific around his domain - or demesne, as he might have preferred. His home base was in Honiara on Guadalcanal, but Guadalcanal has no seaplane anchorage. We embarked his party early in the morning at Tulaghi on Florida Island, across narrow waters rich in wartime legend. Ironbottom Sound, for example, graveyard of HMAS Canberra and many other ships. Also the infamous "Slot", route of the Tokyo Express. (We'd had adventures of our own during the previous 12 hours when (a) the towed refuelling barge swamped and then overturned, dumping 44-gallon drums of 115/130-octane aviation fuel into the tide, some with their filler caps off, and (b) the aircraft complete with its moorings drifted

across the bay in a high wind and heavy chop in the middle of the night; but that is another story).

Whilst at Tulaghi I'd contracted a debilitating case of gastro-enteritis which delayed its full impact until after we reached Tarawa. I was like sick, man, and ready to die. Thought I was going to; even hoped I might. The best the resident ex-pat Scottish medico at Tarawa could do was sympathise and offer a jar of vaseline. The things one suffers for Queen and Country! I've steered clear of bearers of vaseline ever since, especially Caledonians. Also baked beans. By the time I recovered a few days later my crew had eaten almost everything there was, except for what seemed to be a whole barge load of Heinz' finest, courtesy of Burns Philp's Betio Branch. They were all that was left. Yuk!

Communications were not always easy or reliable in that age, before satellites. The HF radio equipment on a Sunderland was principally CW, by Marconi. One conversed at long range in the staccato yet swinging cadence of Morse dots and dashes by carrier wave snatched out of the air as it bounced between the surface and the sometimes turbulent ionised layers high above. On one occasion, however, the turbulence was man-made. While near Tarawa one night, all communication involving HF radio bounce off the ionosphere was disrupted by a nuclear test experiment set off high above the tropopause. We sensed the flash. The aftermath discommoded the reflecting Heaviside layers for a short time.

More normally, on switching to modulated R/T (that is voice mode) in those parts, one could hear a disembodied American voice repeating a message through the ether. It went something like this, in slow, careful enunciation: "Sky King, Sky King, this is Okinawa, this is Okinawa. Do not answer. Do not answer. Authentication is Alfa Charlie. Authentication is Alfa Charlie. Break - break. I say again. Sky King, Sky King, this is Okinawa ....." Over and over. It was both comforting and chilling, though not for its mystery (which was transparent) nor for its bland repetitiveness, but for its significance in the tensions of the Cold War. These were Emergency Action Messages (EAMs, part of the Strategic Air Command system. A reader of this post has recently told me that Okinawa was not one of the base station callsigns on that network, and that it would have been Yokota instead. Yet I heard it as Okinawa at the time; and if that is wrong the error is mine.)

One of our signallers was a radio ham. Once, defying telecommunication regulations, we set up a small, home-built, low-power W/T transmitter ashore at the barracks, and strung a long antenna between two coconut trees more in hope than in expectation. Dah d'dah dit, dah dah d'dah we whispered on the key, repeating it thrice into the ether. CQ-CQ-CQ, we said to the world in the universal shorthand query. Calling all stations; is anyone there? DE (this is) followed by our callsign. Then QTH (my location is) TARAWA, and a tentative K (over). A pause, listening. Nothing but distant, resonant static.

Then the responses crashed in. Suddenly there were incoming calls queued from all over. The United States, Europe, Japan, Okinawa, Australia, New Zealand. And, as news of the contact spread through the amateur bands, more joined the queue in order to log the unusual DX. Having triggered this off at about 8pm, it took until 4am to clear the jam.

Obviously, more than 30 years after the battle for the reef, Tarawa continued to weave strange tropical spells!

THE RISE AND FALL OF THE FLYING-BOAT

"Drat!" (or words to that effect) said the captain on the intercom as he closed the throttles. "Brace, brace, brace", he followed on more urgently; and disconcertingly.

The Sunderland flying-boat settled waterwards and pounded into the face of the next swell. Having too much speed to be a boat but not enough to be a bird, when the machine was thrown off again into the air it just wallowed clumsily. The nose lurched up and a wing dropped. A rapid and coarse application of rudder and aileron arrested the tilt. The machine hit the water a second time, nose high but more or less square on. And it hit hard; a jarring encounter verifying the hitherto half disbelieved assertion that water is less compressible than dirt.

This time the craft stayed down. Though it wallowed awkwardly during the runout over succeeding swells it did remain afloat and, happily, did so with topsides and keel still in their original relationship. Had the wing not responded to the controls (and to certain impromptu but prayerful imprecations from the cockpit) the float on the low side would likely have been torn off, in which case the design margins would have been much more sorely tested.

The date was 26 April 1960. The place was Kwajalein, in the Marshall Islands of the central Pacific. The occasion was an attempt to take off from the lagoon in RNZAF Sunderland NZ4113. The aircraft was one of several from Laucala Bay and Hobsonville, then enroute via Tarawa, Kwajalein, Guam and Sangley Point to Seletar in Singapore for the SEATO maritime Exercise "Sealion" in the South China Sea.

The base at Kwajalein hosted a squadron of US Navy Martin P5M “Marlin” amphibians at that time. The lagoon is not fully enclosed by the reef, however. Gaps lie open to the long Pacific swell, through which it can invade.

Kwajalein

Within reason, short-period chop was normally little problem for flying-boats. But this was not so for longer-period swell, which could be critical, especially for such as the Sunderland. Though it was less the case for the more robust Marlin, here is to be found one of the reasons the flying-boat would not mature in either military or commercial service.

The land-plane, of course, had advantages other than never having to tame the authority of the sea. In the end it would turn out to be much simpler and cheaper to provide the necessary terminal and other infrastructure support wholly on land than to bridge from land to seadrome. Ready accessibility was the key. Wheeled support vehicles, permanent fuel reticulation, accessible maintenance hangars, passenger and freight handling facilities and many other things all had (and have) a huge advantage of convenience over the complications of floating support tenders, refuelling barges, routine aircraft preparation in the open whilst afloat at an anchor or a buoy, and the awkwardness of transferring passengers and freight across a water gap, no matter how short, from dock to flying machine.

In general aircraft maintenance there was also the problem that sea water and the alloys used in aircraft construction are sworn foes. Salt water corrosion of aircraft body parts, propellers and engines was an intractable additional technical burden in the case of the flying-boat. This is a principal reason why mating a gas turbine engine to a seaplane was never really successful, though several attempts were made to do it. The metallurgical hi-tech in the gizzard of such engines was simply unequal to gallons of salt water swallowed during takeoff and landing.

Until a land-based network was established, however, and across the broad expanse of the Pacific in particular, the flying-boat had the running. Given that the range capabilities of the longest-range aircraft of early days was still very short in the terms of today, the scattered Pacific atoll lagoons offered a prospect of usable haven to a youthful international aviation industry. And, in the 1930s as the industry began to take off as it were, expectations did lie with flying-boats. But the war lay just ahead. When it ended it had exposed the comparative advantage of the landplane so emphatically that the balance had shifted. The flying-boat would never become a truly competitive people-shifter in mass. This result would have happened anyway of course, but the war made it happen sooner.

Engine change at Guam

In 1935, however, the war and its outcomes were still in the future, and a usable land airfield network across the huge Pacific was barely conceivable. Accordingly, in November that year a US-NZ Air Agreement was signed, authorising Pan American Airways to begin regular services between San Francisco and Auckland. The route would be via Honolulu, Kingman Reef in the Northern Line Group

and Pago Pago. An earlier proposal that (the British) Imperial Airways should operate trans-Tasman services through a New Zealand-based company had already been ratified by the Australian, British and New Zealand Governments. Nevertheless, unlike Australia for which Britain was most conveniently west-about, New Zealand at the 180th meridian was more inclined to take a bob each way and look at least equally to an east-about route through the Pacific.

RNZAF Flying Boat Base Lauthala Bay

In March 1937 a Sikorsky S42B flying boat made the proving Pacific flight. The captain was Edwin Musick whose name was given to a point of land in Auckland Harbour. The first scheduled flight, also with Captain Musick, was in December 1937. In the same month an Imperial Airways flying-boat arrived from Britain via Australia and the Tasman route.

The experimental Pacific route had practical shortcomings, however; and alternatives were sought. This led to some diplomatic shadow-boxing between Britain and the United States as each sought to establish sufficient authority over possible island waystations to support regular national flying-boat traffic across the long oceanic expanses. For example, in 1937 there occurred the Canton Island incident (Canton Island is in the Phoenix Group, east and slightly south of Tarawa).

HMS Wellington, a Grimsby-class sloop on the (then) New Zealand Station of the Royal Navy, arrived at Canton on 26 May. She had visited Suva enroute where she had represented the RN at the Coronation celebrations there. Her declared purpose at Canton was threefold: to act as a base ship for the New Zealand Total Solar Eclipse Expedition, to carry out a sextant survey for Admiralty charts, and to plant a substantial number of coconut palms. But events suggested that a fourth, less candid item also lay on the agenda.

On arrival at Canton Wellington found that the only secure anchorage was already occupied by USS Avocet, a US Navy seaplane tender according to reports in the National Geographic of September 1937, but a minesweeper according to Wellington's own report. Avocet was there for like purposes, to provide a base and support for an American solar eclipse observation mission jointly sponsored by the National Geographic Society and the US Navy.

Earlier on 18 March that year the British Ambassador to the United States had handed to the US Government a copy of an Order-in-Council whereby Canton and other islands had been incorporated into the Gilbert and Ellice Islands colony (Evening Post, 20 July 1937). The Captain of HMS Wellington

was aware before arriving at Canton that the Americans were already there, having been alerted during passage by SS Niagara and SS Aorangi. He asked USS Avocet to yield the anchorage since Wellington needed it for safety reasons (she was the larger ship and claimed to need the room), and because the Phoenix Group had been declared British colonial territory which gave the British ship preference over others.

Avocet declined, citing incapacity during an engine overhaul programme then in hand. The US Navy Captain in charge of the US naval party said he had been told in Honolulu of the British Order-in-Council. The American expedition had, he said, previously asked the State Department to obtain permission from the British Government to land at Canton. The State Department, however, had advised that no prior permission was required because the ownership of Canton and the Enderby Islands was undecided, and the State Department did not anyway recognise British sovereignty over them.

Wellington moored nearby, having obtained an assurance that if her safety was indeed imperilled then Avocet's engine overhaul would be interrupted and the ship would move. As it happened Wellington did drag her anchor and was obliged to go to another anchorage; this time to a safer position. Force of circumstance thus very much weakened the original contention that Avocet was occupying the only anchorage safely available to Wellington.

After the strained start the relationships between the two parties developed in a cooperative and cordial manner. Facilities were shared. The American Captain showed the engineer officer of Wellington a four-foot high concrete plinth with National Geographic Society commemorative medallions and two two-foot American flags enamelled on iron embedded into it. Wellington's report mentions in passing that no attempt had been made to interfere with the "proclamation of ownership" boards left by HMS Leith in 1936 and earlier in 1937; the Union Jack also left by Leith was still flying, though tattered. Wellington herself left another proclamation board, nailed to a coconut tree; and on high ground a brick structure four feet high (the same height as the American plinth) with galvanised iron plates let into it bearing a painted Union Jack. Wellington also planted 3,000 coconut palms brought from Suva for the purpose.

An extract from a broadcast made on 16 May 1937 by a commentator of the National Broadcasting Corporation of America who was attached to the American expedition is said to be: “Before us are the nine palms, with their fronds bent and twisted all in one direction from the constant East wind, and between two trees is planted a tattered British flag on a staff and two water boxes, with the words painted on their sides 'New Zealand Eclipse Expedition of 1937'. Nailed against one trunk and partly obliterated already is a sign on which we can read 'This island belongs to His Britannic Majesty King Edward VIII'". Two things seem not quite right about this, however. It could not be that HMS Wellington had placed the 1937 Expedition notice before 16 May, because she did not arrive until the 26th. And, had the American commentator been more familiar with matters Royal he might have spotted another anachronism in the conclusions he sought to have his audience believe. The Royal "ownership" sign was weatherbeaten and the flag tattered not because the elements had got at them in short order, but because they been put there the year before, preceding the Abdication. Had the sign been placed by the 1937 expedition it would have read George VI, not Edward VIII.]

Meantime members of the New Zealand civilian scientific party had elicited from their American counterparts the opinion that Canton would "unquestionably" become an airport in the near future. Wellington's Captain reported his own opinion that with a certain amount of coral blasting large stretches of the lagoon could be cleared for a flying-boat seaway. A landing ground could also be established on the north west corner of the island without much difficulty.

On 29 June an immediate message was sent from the Commodore Commanding New Zealand Station to the Secretary of the Admiralty reporting these events. He intended to visit the Phoenix Group in HMS Achilles during the first week in August. He speculated that the sudden decision by the American Government to send the expedition to Canton might have been the result of an unfavourable report from the experimental flight to New Zealand on the intermediate bases at Kingman Reef and Pago Pago, which seemed to be unsuitable for the heavy flying boats which Pan American Airways intended to use. Canton was more attractive because it was approximately half way between Honolulu and New Zealand; it had reasonable land facilities for stores etc; it could be made suitable for heavy flying boats and possibly land planes; and ownership by the United States "appears to them to be possible". He remarked that the development of civil aviation in the South Pacific was bound to come, and that the American Government was extremely anxious to extend its commanding position in the North Pacific into the South as well, both for the purposes of defence and in order to have a well-established company by the time a paying service was possible. He was convinced that the Americans would soon try to obtain possession of Canton Island; and he sought an indication of British Government policy.

In the New Zealand Herald of 9 July 1937 there appeared a number of articles reporting the "Naval Incidents" at Canton (it appears from an apology to the Naval Office in Wellington by the civilian expedition leader that a member of his party had been "indiscreet" in speaking to the Press).

As background, the articles included a report from Sydney that a sea captain with the trading company Burns Philp who had visited the Phoenix Group in 1882 in the Auckland barquentine Isabel felt that the Americans had some right to Howland and Baker Islands since there were large boards there, erected in 1840, announcing that they belonged to somebody called Williams of Connecticut. Another captain who had visited there "30 years ago" opined that they were the last places anybody would have wanted.

The main report in the Herald covered in some detail, and with accuracy, the anchorage incident and the increasing density of declaratory notice boards, national flags, monuments and other devices purporting to underscore sovereignty. Mr Peter Fraser, Acting Prime Minister, said the Government had been unaware of the incidents referred to, but that when the information was received it had immediately been transmitted to the British authorities who were responsible for the control of the Pacific Islands. New Zealand was, however, vitally interested in transpacific aviation, and questions concerning British sovereignty in the Pacific area had been the subject of representations to the Home (sic) authorities.

Subsequently the Herald and the Evening Post printed opinions by a professor of international law at Sydney University on matters of ownership of the islands. The Post also printed a report of a question in the House of Commons bearing on the communication to the United States notifying the Order-in-Council. A Labour Member had asked whether any steps were being taken to avoid the recurrence of an unpleasant incident. The Foreign Secretary, Mr Eden, said he would deprecate any suggestion that there had been an unpleasant incident. Had a reply been received from the United States? Mr Eden said he did not think the communication in question requested a reply. The Colonial Secretary, Mr Ormsby-Gore, in respect of the American assertion at Canton that the American Government did not admit British sovereignty there, had said the position thus disclosed was being considered.

The Pacific Island Monthly expanded upon the new-found interest in hitherto unpopulated Pacific islands of questionable economic interest. As had others, the journal saw this as a precursor to the future establishment of air routes. In addition it reported renewed interest in other commercial activities, including an intention by Burns Philp to start operations in the Phoenix Group. And it

reported that on 26 July a Mr William Cowie, a wireless operator formerly of the British Colonial Office in Suva, had embarked in HMS Achilles to go to Christmas Island (then under lease by the British to a French copra company) with replacement radio equipment of greater power, the better to keep in touch with Fanning Island and Suva. The picture accompanying this article has Mr Cowie in mid-stride with his bull-terrier on a lead standing four-square to the camera, against a backdrop of a ceremonial life ring bearing the blazon of HMS Achilles. The caption, it may be thought, strayed toward the lurid in saying that the man and his dog were to hold Christmas Island for John Bull against Uncle Sam. Mr Cowie, it was reported, insisted that the pose was accidental and not symbolical.

Thus, at the time and in the absence of land-based aviation infrastructure - and indeed for some time after the intercession of the Second World War - the flying-boat seemed ideally suited to the Pacific, and Britain and the United States were jockeying for handholds. The underlying assumptions seemed to dismiss concern about lack of airfields. After all it was true, was it not, that the Pacific Ocean was mostly water? And it was true that water was a medium upon which the flying-boat was designed to float? To the general public the symbiosis was comforting in safety terms during an age when neither the reliability nor the range capabilities of airborne machinery was what it is today. If something went wrong the aircraft would surely be able to put down on the ocean, of which there was plenty to spare.

Unfortunately, this comfort was based on an unsound assumption. The flying-boat was in fact neither boat nor bird. The design and construction had to be a compromise between ship and aircraft and, as in many such cases, the compromises can bring out what is not good as much as what is good.

On the one hand because it was an aircraft and weight saving was important, the flying-boat had to be constructed to aviation engineering standards using lightweight aviation materials. Giving it the strength and robustness of shipbuilder's plate steel was not possible. On the other hand because it was a boat it needed a planing hull in a shape designed for water, not for air, but with awkwardly unshiplike appendages of wings and tail attached to it. As the call increased for better designs with lower coefficients of drag to allow higher airspeeds and greater ranges at higher altitudes - and in that latter regard the additional engineering problems of sealing a flying-boat hull for pressurized operation at altitude were considerable - so the shape of the planing hull became an increasingly serious impediment.

Finally, the need for higher and more efficient engine power to deliver improved range and speed soon outstripped the capabilities of the reciprocating engine. Gas turbines either as turboprops or as jets replaced the big and heavy reciprocating radials, and their metallurgy did not tolerate brine. Thus the attempts to develop large flying-boats such as Howard Hughes' Spruce Goose (or even comparable land-planes such as the Bristol Brabazon in Britain) using reciprocating engine technology owed more to faith than to reason. These were not visions ahead of their time, but were unimaginative attempts to clone the past as the future. They were fascinating, eccentric and impractical. They failed.

Beyond that, the story that opened this chapter illustrates the danger of assuming too much of flying-boats. Normally they could not operate from the open sea, or could do so only in the best of conditions. They needed sheltered waters to be safe. Both the takeoff and the landing could be problematical in anything other than a medium, short-period chop. A long-period swell of any significant amplitude could throw the aircraft off the surface before the aerodynamic controls could bite the air and before the wing was ready to fly, as was the case at Kwajalein.

A couple of notes to end this tale.

About a month after the incident on Canton, USS Avocet was involved in searching for Amelia Earhart's Electra, which was presumed missing in the vicinity of Howland Island to the northwest of Canton. There are tales, too, that HMS Achilles, also of the New Zealand Station, was in the vicinity but that neither she nor her Walrus was asked by the Americans to assist in the search – this is unconfirmed, but one American source suggests that "There had been some ludicrous performances on the island involving flags and some pretty tense diplomatic exchanges between Washington and Whitehall. Perhaps, in the wake of all that, the Americans were not about to ask a British ship to conduct a search in that same island group." We shall never know, but what we might observe is that at the very time the two Powers were arm-wrestling over potential seaplane bases, Amelia Earhart and Fred Noonan lost their lives trying to show they weren't necessary.

A second point to reflect upon is that the 1984 row between New Zealand and the United States Navy was not the first time they had disagreed!