

AIRCRAFT PROFILE – THE SHORT STIRLING

By Robin Shaw



It seems to me that the degree to which an aircraft is thought to be outstanding in its class determines the amount of popular literature that is published about it. Histories of the Spitfire abound, for example. The Short Stirling, which was crewed and serviced by many RAAF personnel, was considered mediocre at best by RAF high command. While a great deal of information on the Stirling is now available online, books about the type are few and far between. One that I have had in my collection for many years is *Stirling Wings – The Short Stirling Goes to War* by Jonathan Falconer (Alan Sutton Publishing, UK 1995. ISBN 0-7509-1063-1). Some of this profile is sourced from this book.

As far as I can ascertain, there were no full RAAF Stirling squadrons. RAAF crews and individuals were instead posted among the RAF Stirling squadrons. The appendices to *Stirling Wings* set out in detail the squadrons that operated the Stirling and their bases. While the first RAAF Bomber Command squadrons formed in 1941 when the Stirling was still the only 4-engine heavy bomber in service, they were initially formed with Wellingtons and Hampdens. It is unclear how many Australians flew and serviced the Stirling.

Beginnings

While the RAF was primarily interested in twin-engine bombers in the 1930s, the early development of four-engine types in the US and the Soviet Union led the RAF to explore the concept and prompted the Air Ministry to issue Specification B.12/36. It called for a four-engine heavy bomber with a 250-mph cruise speed, 1,500-mile range and a 14,000 lb maximum bomb load. It also specified a maximum wingspan of 100ft to allow the aircraft to fit into existing hangars. This was to result in one of the aircraft's Achilles heels – relatively poor climb and altitude ceiling. Interestingly, the specification also required the aircraft to be able to use catapult take-off assistance for heavy loads, (a concept fortunately not pursued in this case). The Short Bros. response was a design it designated the S.29.

In early assessments of the proposals made by the primary aircraft manufacturers, the Vickers Type 293 was considered the most promising followed by the Boulton Paul P.90, the Armstrong Whitworth AW.42, the Supermarine Type 316, and then the Short S.29. While the S.29 design that would eventually become the Stirling was not the first chosen for development, it was selected as the backup design. It was about this time that the Air Ministry suggested replacing the proposed Napier Dagger in-line engines with the Bristol Hercules radial as a means to improve projected performance and a number of other changes that required extensive redesign. Very little is known about the Vickers Type 293, the Boulton Paul P.90, the Armstrong Whitworth AW.42 and the Supermarine Type 316 or why they were abandoned in favour of the S.29.

The eventual S.29 design structure drew a great deal on the Short Sunderland flying boat. The wings were practically the same, but mid-mounted rather than high-mounted, and the fuselage was a modified Sunderland structure with the boat hull deleted, although it used continuous stringers in each of 4 sections rather than the previous system of interrupted stringers at each frame. The use of continuous stringers was a major reason for the great strength of the Stirling's airframe and its ability to absorb and survive major battle damage.

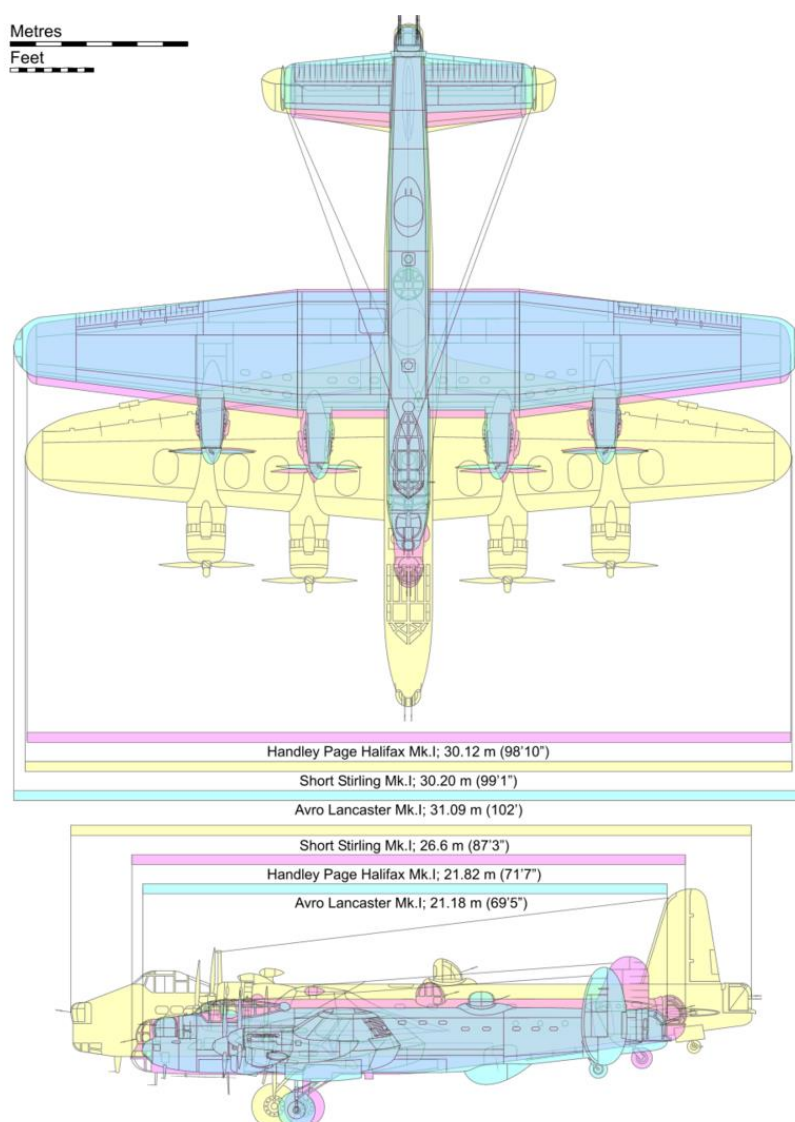
The design of the bomb-bay was compartmented and limited to 500lb and 2,000lb bombs. This was another factor that led to the Stirling's short operational life as a bomber. The Lancaster, by contrast was eventually able to carry huge weapons such as the Upkeep dam-busting bomb and the massive 'cookies', Tallboys and Grand Slams.

Given that the design, while drawing on the Sunderland, was nevertheless breaking much new ground, Short Bros. took the unusual step of building a half-scale version, the S.31 (below) to test its aerodynamics and handling qualities.



The S.31 impressed the RAF overall, but it was criticised for its long take-off run. The RAF suggested that the angle of attack of the wings be increased. Shorts objected because doing so would cause the aircraft to fly with a nose-down attitude (as was the case with the earlier Armstrong Whitworth Whitley bomber). Instead, the main undercarriage was made longer, giving the final design its characteristic storky appearance on the ground and creating the other Achilles heel – undercarriage collapses.

The final design was turned into the first prototype. Just how big the Stirling was is illustrated in the diagram below, that compares it with the Halifax and Lancaster (source – historiek.net). The first flight of the prototype was successful until the landing. A main gear brake froze, causing the first of a long history of undercarriage collapses for the type.





The issue with the structure of the undercarriage was caused by two weak linkages in each main gear, one on each side (circled in red at left). This problem was never properly resolved.

There were also issues with the retractable twin-tyre tailwheel, which tended to castor uncontrollably on landing, causing major vibration and loss of directional control. This was only resolved when a special tyre was designed and fitted. The type also had the disturbing tendency to turn its huge main gear tyres on their rims on landing, which could eventually cause valves to shear. This required inspection of the tyres after each landing.

As it finally emerged, the design had a few features that differed from the later Halifax and Lancaster, one of which was dual flight controls (right).

The Stirling entered production in 1940.



Into service



The first operational Stirling missions were flown by 7 Squadron RAF on 10 February 1941. Eventually, 26 squadrons would operate bomber and other versions of the Stirling at various stages of the war. As operational tempo increased, the Stirling became a mainstay of Bomber Command pending the arrival of the two later 'heavies' the Halifax and the Lancaster. This was despite its poor ceiling and climb performance (occasioned by the original specification, not the designers) and limited bomb load. Among the notable missions it was used for was the first thousand-bomber raid on Cologne

The Stirling was also the pioneer type when the Pathfinders were formed in August 1942.

In front-line service with Bomber Command, Stirlings flew 14,500 sorties and dropped 27,000 tons of bombs. 582 aircraft were lost in action while a further 119 were written off. By December 1943, Stirlings were being withdrawn from frontline service as bombers. They were subsequently used for minelaying, as glider tugs, paratroop drops, special operations support, transport and passenger aircraft. The later marks of the type were purpose-built for transport work and lacked gun turrets.

As is often the case, the air and ground crews who operated the Stirling fiercely defended it against the sometimes-harsh criticism of the type by others. Air Marshal Sir Arthur 'Bomber' Harris, C in C of Bomber Command was scathing. Crews of newer types such as the Lancaster derided the Stirling for its ceiling, climb and bomb load limitations. Pilots nevertheless described the Stirling as surprisingly light and manoeuvrable in the air and free of vices. From a handling standpoint, the biggest challenges were take-off (probably associated with the short wingspan and engine power), and landing, including the undercarriage and tyre issues described above.

Perhaps the most illustrative example of the Stirling's limitations came when Italy declared war in June 1940. Bomber Command was called upon to bomb targets in northern Italy. This required aircraft to cross the Alps. Given the extreme range, heavy fuel loads and light bomb loads were required. On many occasions, especially when icing conditions were encountered, the Stirlings were unable to clear the higher peaks and aborted or worse, hit them. The wreckage of those Stirlings and the remains of their crews were still being found in the 1990s.

Over 2,800 Stirlings were produced in the following marks:

Stirling I - powered by Bristol Hercules XI engines. 712 built.

Stirling II – intended for production in Canada but cancelled in favour of other types. Powered by 1,600 hp Wright R-2600 Twin Cyclone engines. Only 4 built.

Stirling III - powered by Bristol Hercules XVI engines. 1,047 built.

Stirling IV - Assault transport for gliders and paratroops, powered by Bristol Hercules XVI engines. 450 built.

Stirling V - cargo and passenger transport, powered by Bristol Hercules XVI engines. (Interior shown at right). 160 built.



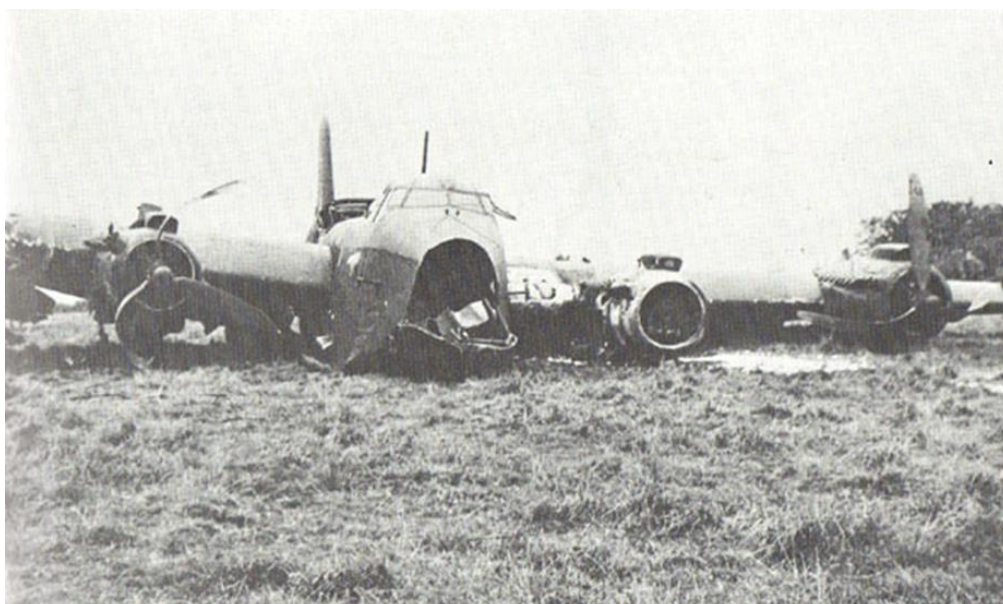
The Stirling was fully withdrawn from RAF service in 1946, with 10 examples of the Mark V going on to serve with the Belgian airline Trans-Air, 9 of which were later passed on to Egypt. No intact examples now exist although I understand that a [restoration project](#) is under way in the UK.



Left – Stirling Mark V in Belgian service, circa 1946

A tribute to the strength of the Stirling

On 28 September 1944, LJ932 NF-N of 138 (Special Duties) Squadron was returning from a drop of Special Operations Executive (SOE) personnel in Denmark. The aircraft was badly shot up by a Ju 88 night fighter, destroying the starboard inner engine and wounding the pilot, F/L R. W. Reed and the Flight Engineer, P/O Sam Curtis. With help from the radio operator, Reed and Curtis nursed the Stirling back to England. On emergency approach to Ludford Magna in Lincolnshire, both port engines failed and NF-N crash landed on the edge of Ludford Magna village. All 3 were awarded immediate DFCs and the rest of the crew escaped unharmed.



Another remarkable example of the Stirling's survivability was a successful return to base after a head-on collision over Hamburg on 23 September 1943, between a Bf 109G and Stirling EH941 of 15 Squadron RAF. All aircrew survived, including the pilot of the Messerschmitt Feldwebel Herbert Chantelau, who baled out.

A Luftwaffe Stirling?

A 7 Squadron RAF Stirling N3705 MG-F made an emergency landing in The Netherlands on 16 August 1942. The aircraft was salvaged and repaired by the Germans and tested in Luftwaffe markings. In the photos below, the Germans have covered the nose with what appears to be a tarpaulin, probably due to damage from the emergency landing. The fate of this aircraft is unknown.



Few production aircraft have been so roundly criticised and so stoutly defended as the Short Stirling. Most of the design shortcomings should properly be sheeted home to the original Air Ministry Specification B.12/36 that limited the wingspan. The designers at Short Bros. did their best within the specified constraints. With a short front-line service life and being overshadowed by the brilliant Lancaster, the Stirling is not remembered as well today as perhaps it should be.

