



Stirling Service

The Short Stirling was the first of the three RAF heavy bombers to enter service in World War Two. **Malcolm V Lowe** tells the story of this famous RAF warplane

Designed from the outset as a four-engined heavy bomber, the Short Stirling was destined to be overshadowed by its two more famous companions in the RAF's nocturnal heavy bombing campaign of World War Two, the Avro Lancaster and Handley Page Halifax. It nevertheless played an important part in Bomber

Command's operations, but, later in the war, Stirlings also performed several other tasks, including the significant role of glider-towing during some of the war's most important airborne operations.

In retrospect, the official specification that led to the creation of the Stirling was far-sighted for its time. Issued during 1936, Air Ministry

Specification B.12/36 called for a long-range strategic day and night bomber at a time when 'long-range' did not yet mean distances the equivalent of, for example, a transatlantic crossing. The only company at that time in Britain that could claim to be a manufacturer of aircraft capable of regular long-range flight was Short Brothers of

Rochester in Kent with its 'Empire' flying boats. It was therefore appropriate that this designer and manufacturer easily became the front-runner in the competition to meet Specification B.12/36. The company is often referred to by its abbreviated name Shorts or simply Short.

Other features officially called for in Specification

B.12/36 included a four-engined design, which was again a far-sighted requirement at that time. Once more, Shorts had the experience already to hand with the four-engined layout of the 'Empire' flying boats.

A bomb load of some 14,000lb was required, together with defensive turrets in the nose, rear fuselage and ventral positions. The design also had to be capable of transporting 24 troops, for whom windows were required in the fuselage sides. Operations from grass airfields was a further need.

Shorts succeeded in having its tender accepted in February 1937 and received a prototype contract that September. Shorts called the new aircraft the S.29.

The company's designers appear to have been keen to base the new bomber's wing design on that of the long-range Sunderland flying-boat that the company was actively developing. This would have meant a span of some 115ft. Unfortunately, a requirement

surfaced that demanded a wingspan of less than 100ft to allow the new bomber to fit into the openings of the RAF's hangars on expansion period airfields. This was disastrous for the new design because it resulted in a compromise wing layout. Despite the best efforts of Shorts' aerodynamicists, the wing's high drag and adverse effect on the overall design resulted in an aircraft that could fly a long way with a large bomb load, but had a very low service ceiling. The latter was to prove extremely costly in operational service.

As a proof of concept and to resolve several pressing issues, Short took the unusual step of building a half-scale wooden 'model' trials airframe designated S.31 of the new bomber. It was powered by Pobjoy Niagara III radial engines of some 88hp at sea level. The first flight was made on September 19, 1938 at Rochester. It proved the concept of the new warplane, but also suggested a number of changes regarding the troublesome wing and its positioning (incidence) on the fuselage. This particularly affected take-off performance. By that time, however, the manufacture of production tooling for the full-size aircraft had already begun

Short Stirling Mk.III

Specifications

Powerplant	4 × Bristol Hercules Mk. XVI air-cooled radial piston engines of 1,650hp (1,230kW) each for take-off
Crew	7
Length	87ft 3in (26.59m)
Wingspan	99ft 1in (30.20m)
Empty weight	46,900lb (21,273kg)
Max take-off weight	70,000lb (31,751kg)
Performance	
Maximum speed (clean)	270mph (435km/h) at 14,500ft (4,420m)
Range	2,010 miles (3,235km) with 3,500lb (1,588kg) bomb load
Service ceiling	17,000ft (5,182m) (less with full bomb load of 14,000lb)
Armament	Eight 0.30in Browning machine guns: two each in nose and dorsal (mid-upper) turrets, four in rear turret. Up to some 14,000lb (6,350kg) of bombs in lower fuselage and wing centre section

and the only way to fix the issue was to make the main undercarriage longer, thus giving the already tall bomber even more height.

Flight testing

The first take-off of the new warplane, with the British military serial number L7600, took place on May 14, 1939, with John Lankester Parker at the controls. The aircraft flew very well, but

was written off on landing when a brake seized and the 'stalky' main undercarriage collapsed. This set back the whole programme. The second prototype with a modified and strengthened main undercarriage, serial number L7605, did not fly until December 3, 1939. It was May 7, 1940 when the first production aircraft (N3635) made its maiden flight at Rochester.

The name Stirling was given to the new bomber and its initial production version was the Mk.I, powered by four Bristol Hercules Mk.II radial engines. Indeed, in subsequent construction, all production Stirlings were fitted with different marks of the ubiquitous Hercules power plant. No inline engines were ever installed in production Stirlings.

Known to most sources as the Stirling Mk.I Series I, the initial Hercules II-powered airframes were supplanted by Mk.I Series II machines powered by the Hercules Mk.XI, using improved engine mountings. The Mk.I Series III had complete power units supplied directly from Bristol's aero engine division.

LEFT: A rare colour photo of Stirling Mk.I conversion trainer N6101/E with 250lb bombs at RAF Waterbeach ALL PHOTOS MALCOLM V LOWE COLLECTION EXCEPT WHERE STATED

BELOW: Austin Motors (Austin Aero) at Longbridge, Birmingham built many Stirlings. Note the size of this 1941 Mk.I's fuselage compared to the workers



The new bomber was of all-metal structure, with provision within the thick but abbreviated wing for no less than seven fuel tanks on each side. A long bomb bay in the lower fuselage was divided into longitudinal sections, which limited the size of bombs. Stirlings could not carry the large weapons of 4,000lb and greater, that Lancasters, Halifaxes and Mosquitoes were able to use later in the war. Additional bomb bays were built into the lower part of the wing centre section on each side, that could be used instead for overload fuel tankage if necessary. With all this fuel capacity the Stirling had an impressive range of easily in excess of 2,000 miles, making it one of the longest-legged of the early war bombers.

Normally a crew of six or seven was carried on operations. Defensive armament comprised eight 0.303in Browning machine guns: two each in the nose and dorsal (mid-upper) turrets, and four in the rear turret.

All Stirlings had a lot of windows and glazed panels

in their fuselages, which often saw detail variations depending on manufacturer, intended role or overhaul/conversion. These were a result of the original official specification that led to the type's creation, which had called for transportation of troops to be an important extra role for the bomber.

Developed versions

The availability of engines was always an important issue during the early part of the war, occasioned by potential supply difficulties, especially those caused by the bombing of manufacturing plants. A disastrous raid against the Rochester factory on August 15, 1940 also suggested that construction of the entire aircraft should be pursued elsewhere, well away from danger. To that end, the Stirling was selected for manufacture in Canada, with the introduction of US power plants – the Wright R-2600 Cyclone (sometimes called the 'Double Cyclone'). Two Stirlings were converted from Mk.I airframes with this engine type and designated Stirling



A classic in-flight view of a Stirling Mk.I, W7459/O, showing off the type's undoubted manoeuvrability. The aircraft was assigned to 1651 Heavy Conversion Unit, a training organisation whose Stirlings were much photographed during the mid-war period. The type's unusual twin tailwheel configuration is clearly evident

Mk.II. But the power plant shortage did not materialise, and increased aircraft manufacture at home meant the project was dropped.

Instead, a new Stirling was born, the Mk.III, powered by the Bristol Hercules Mk.XVI radial engine. This more powerful Stirling was the best of the bomber

versions. Externally it was similar to the Mk.I, but fewer windows were fitted to the fuselage beside the cockpit and in the rear fuselage sides. Additionally, the tall Frazer-Nash FN.7 mid-upper dorsal fuselage turret of the early Stirlings was replaced by an FN.50 unit in a new mounting. This arrangement was also incorporated on late-production Stirling Mk.I Series III airframes.

Manufacture of Stirlings was pursued at Rochester (Shorts), Belfast (Short Brothers & Harland), Longbridge, Birmingham (Austin Motors' Austin Aero division), and at South Marston (Shadow Factory).

Due to its abbreviated wing, the Stirling suffered from a low service ceiling of just 17,000ft – lower if a full bomb load was carried. This was one of the reasons why the type's eventual service as a heavy bomber with the RAF was shorter than that of the Lancaster and Halifax. On the plus side, however, it was very manoeuvrable due to its foreshortened wingspan, and was said to



Photographed at RAF Waterbeach, Cambs, Stirling Mk.I N3676/S was assigned to 1651 Heavy Conversion Unit. It is thought that the aircrew member second from the left in this posed, but atmospheric, genuine colour image was an American, Leonard A Johnson JB VIA MALCOLM V LOWE



A brand new Stirling Mk.III, EF310 at Queen's Island, Belfast, just completed by Short Brothers and Harland. Behind it are examples of that most iconic of all Shorts' warplanes, the Sunderland flying boat

“But the main purpose of the Stirling for Bomber Command was nocturnal bombing, and the type featured in many of the famous actions during 1942 and 1943, including the first ‘1,000 Bomber Raid’”

have been as easy to throw around the sky as some of the RAF's frontline fighters.

Operational reality

The Stirling Mk.I was initially assigned to 7 Squadron, RAF, in the summer of 1940. After a long familiarisation, the first operation was flown during February, 1941 from the unit's base, RAF Oakington in Cambridgeshire. It was followed by 15 (XV) Squadron during the spring of 1941. Gradually the type was allocated to further RAF squadrons, by which time the nocturnal bombing campaign against German targets was developing into a massive effort. The Stirling subsequently played a key role in this growing undertaking, in which it was later joined by the Lancaster and Halifax. Bomber Command Stirling units eventually numbered some thirteen squadrons.

The comparatively low operational ceiling of the

Stirling, especially when carrying a full bomb load, proved more and more dangerous as the war progressed. At the same time, German defences against incoming raids continued to improve, not just with radar capability, but also deadly anti-aircraft fire. German ground-based gunners were easily able to target Stirlings at their lower levels, leading to losses that accounted for the comparatively early retirement of the type from bombing activities.

A particularly hazardous type of mission that Stirlings were involved with as 1941 wore on was in daylight ‘Circus’ operations. These were bombing raids against usually pinpoint military or manufacturing targets in Occupied Europe, with heavy fighter cover. Part of the reason for these missions was to draw out the German fighter defences. Stirlings featured prominently in

these operations, sometimes successfully, but often with significant losses.

But the main purpose of the Stirling for Bomber Command was nocturnal bombing, and the type featured in many of the famous actions during 1942 and 1943, including the first ‘1,000 Bomber Raid’ against Cologne during the night of May 30-31, 1942.

The Victoria Cross is the highest military medal for gallantry by British and Commonwealth service personnel. In the course of the rugged night-time campaign of Bomber Command, two Stirling pilots were posthumously awarded this honour. Both held the rank of Flt Sgt and both were involved in bombing raids against Turin in Italy. They were Rawdon Hume (Ron) Middleton, Royal Australian Air Force of 149 Squadron (November 1942), and Arthur Louis Aaron of 218 Squadron (August 1943).

Apart from the heavy bombing role, the RAF's Stirlings performed many other tasks. One of the units within the specialist and secretive 100 Group, 199 (Bomber Support) Squadron at RAF North Creake, Norfolk, employed Stirlings on electronic warfare sorties. Equipped with Mandrel radar-jamming equipment (as well as Window foil strips) and identifiable with the fitting of additional external aerials, the unit's Stirlings accompanied the main Bomber Stream on night bombing missions.

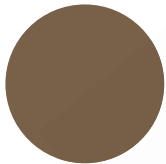
The Stirling was also a founder of the pathfinder force that grew into 8 Group, Bomber Command, 7 Squadron, becoming one of the first units to join this increasingly vital organisation. Other important operations included mine-laying off the German coast.

When it came into frontline service, the Stirling was by far

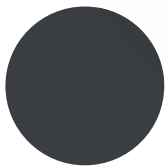
FlyPast Classics 25 SHORT STIRLING



Dark Green
FS. 34079
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Dark Earth
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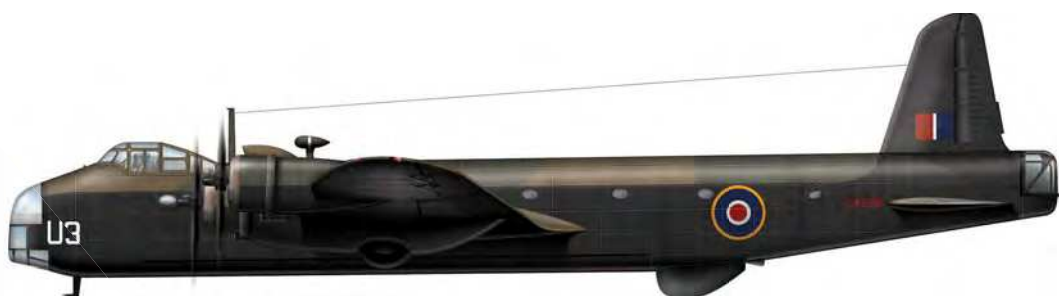
Night Black
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Stirling Mk.I, N6065/LS-G, 15 (XV) Squadron, RAF Bomber Command, March 1942. This is the standard appearance of early Stirlings with a high fuselage paint division, comprising a Dark Green/Dark Earth/Black finish. Light Grey or Medium Sea Grey code letters, Dull Red serial number

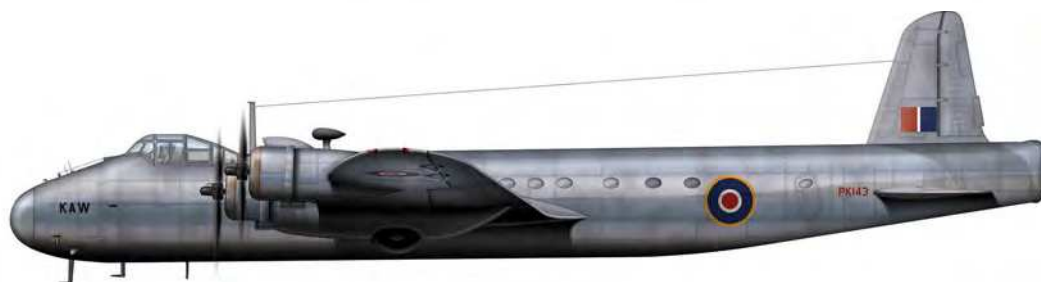
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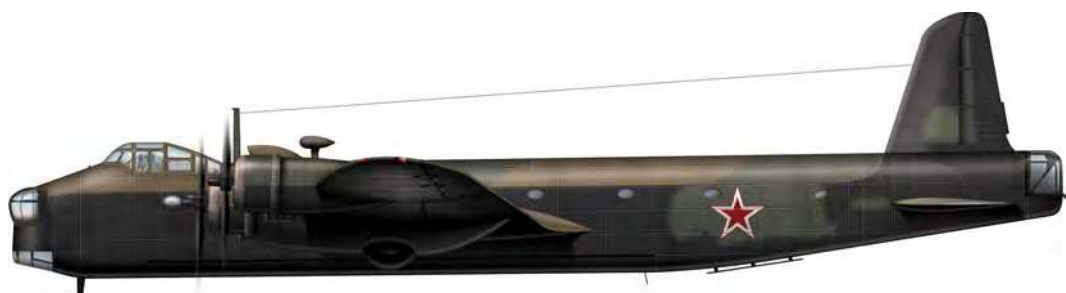
Stirling Mk.III, LK508/U3, RAF Central Navigation School (later Empire Air Navigation School), RAF Shawbury, 1944. This was one of a small number of Stirlings fitted with H2S radar, as shown by the large bulge below the fuselage. Standard Dark Green/Dark Earth/Black finish. White code on nose, Dull Red serial number

Stirling Mk.IV, LK203/8E-B, 295 Squadron, RAF Harwell, Berkshire/Oxfordshire. Glider-towing was a vitally important task performed by Stirlings in the latter stages of World War Two. Standard Dark Green/Dark Earth/Black finish, Dull Red codes and serial number



Stirling Mk.V, PK143/KAW, 46 Squadron, RAF Stoney Cross, Hampshire, 1946. Natural metal finish common to many Stirlings used for transport duties this late in the type's service career. Black letters on nose, Dull Red serial number

Stirling Mk.III, LK615, Soviet air force flight test establishment LII VVS, 1944. This was the only Stirling officially to reach the Soviet Union, its original RAF markings being crudely painted out. Standard Dark Green/Dark Earth/Black finish. Many details of this aircraft remain a mystery



Stirling Mk.V, Egyptian-operated former Belgian civil transport, late 1940s. One of the handful of Stirlings that were clandestinely supplied to Egypt. Some were apparently used for transport and occasionally for bombing sorties during the 1948-49 war with Israel. Reconstruction based on photographs and testimonies from witnesses

the largest operational mass-produced warplane that the RAF had employed. Indeed, throughout the type's service life, comparatively numerous training units were dedicated to schooling not just aircrew, but also ground personnel as to the working of this beast. Several Heavy Conversion Units specifically flew the Stirling as it was completely different to master, compared to the RAF's other nocturnal bombers.

Very few Stirlings were ever fitted with H2S radar, unlike the Lancaster and Halifax which were equipped with this bombing radar as standard. The small number of H2S Stirlings were mainly employed for trials and training purposes, the Central Navigation School (later Empire Air Navigation School) at RAF Shawbury, Shropshire, being one of the few users of the type.

As increasing numbers of Lancasters and Halifaxes

became available, Bomber Command squadrons started converting on to them from the Stirling. Both the Lancaster and Halifax were faster and could fly higher than the Stirling, and it was those two that eventually continued the RAF's nocturnal bombing campaign to the end of the war. The final Stirling squadron of Bomber Command (apart from special duties) was 149 Squadron in September 1944.

Different tasks

The winding down of nocturnal bombing using Stirlings was by no means the end of the type's operational career. Two further marks of Stirling were produced that gave the type a new lease of life and several very different mission profiles.

The first was the Mk.IV, a specialist troop/paratrooper transport that could also tow gliders for airborne forces. The Stirling's considerable

power made it ideal for this, and very little conversion work was needed to ready the type for this specialist role. The mid-upper fuselage dorsal turret was deleted and faired over, and the nose turret removed, replaced by a transparent fairing. The four-gun rear turret was retained.

For glider-towing, a large braced semi-circular fitting was installed beneath the rear fuselage, with a guard to ensure the towing cable did not venture under the fuselage ahead of this. Two Stirling Mk.III were converted as development prototypes for the new configuration, flying in the summer of 1943. In addition to series production of the Mk.IV, a number of Mk.III bomber Stirlings were converted to Mk.IV standard.

The comparatively low operational ceiling of the Stirling was never a problem for glider-towing, these operations being carried out at comparatively low level.

Stirlings thus played a significant part in the major airborne missions in northwest Europe, including the many paradrops and glider landings of the D-Day period during June 1944, the Arnhem and Nijmegen operations of September 1944, and the Rhine Crossing in March 1945.

Completely unrelated to these major events, several units that were engaged on clandestine special duties operations used the Stirling as a part of, or as their main equipment. Their roles included parachuting agents into Occupied Europe, and the dropping of supplies including weapons to partisans and resistance fighters. During the course of the war, a surprisingly large number of squadrons were involved at one time or another in these operations, sometimes as an aside from their main role.

The final production version of the Stirling was the Mk.V.

“The Stirling was also a founder of the pathfinder force that grew into 8 Group, Bomber Command, 7 Squadron becoming one of the first units to join this increasingly vital organisation”



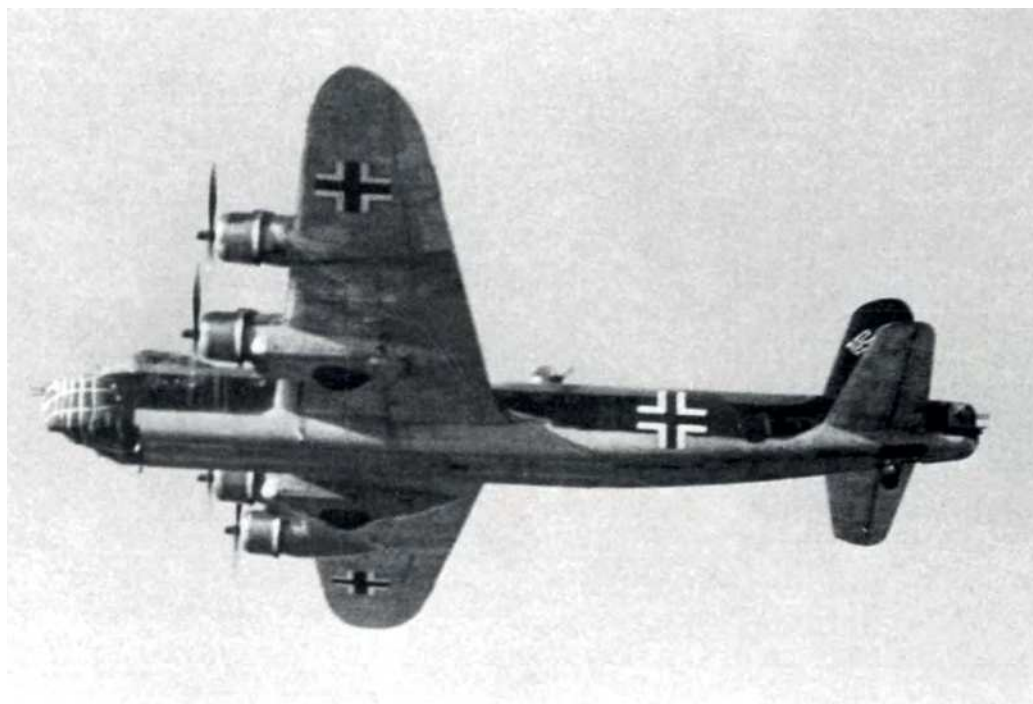
ABOVE: A 570 Squadron Stirling Mk.IV coded V8-K photographed in the summer of 1945 on a humanitarian mission at Prague, Czechoslovakia. It was about to embark orphaned Czechoslovakian children who had been in concentration camps during the German occupation, and were being taken to England for rehabilitation

It was a dedicated, unarmed transport/freight carrier, which featured a completely redesigned nose and forward fuselage. This was lengthened and had an opening section with a glazed front. In the rear starboard fuselage side, a large freight door was installed that was capable, with appropriate ramps, of loading a Jeep or small field gun, or simply ordinary boxes of cargo of all kinds. Alternatively, the type could carry up to 40 passengers or 20 fully-equipped troops.

The initial examples were delivered to the RAF in September 1944, with 46 Squadron at RAF Stoney Cross, Hampshire the first recipient several weeks later. The type was subsequently employed by a small number of units on long-distance passenger and freight flying for the RAF.

With the coming of peace, many Stirlings of all available marks were employed as transports for a variety of tasks before retirement. One of these was the repatriation of former prisoners of war who were freed at the end of the conflict.

With the arrival in service of the Avro York transport



ABOVE: With Heath Robinson bandaging on its wounded nose, Stirling Mk.I N3705/MG-F formerly of 7 Squadron flew under new Luftwaffe ownership. It was later evaluated at the Erprobungsstelle test centre in Rechlin HANS MEIER COLLECTION

BELOW: A blurry but unique photo of three Egyptian-operated Stirlings on a flypast. The original image shows the painted-out Belgian civil registrations under the wings. The left-hand aircraft seems to be formerly OO-XAD



derivative of the Lancaster, even the Stirling Mk.V transports were withdrawn. The final operational RAF Stirling of any kind was a Mk.V of 1588 Heavy Freight Flight in July 1946.

Export Stirlings

There were no actual military export customers for the Stirling, but Germany's Luftwaffe and the Soviet Union each became the beneficiaries of a single airworthy example.

Germany came to own a Stirling when Mk.I N3705/MG-F of 7 Squadron made a forced landing with its undercarriage down near the Dutch air base of Gilze-Rijen on August 16, 1942. The aircraft's nose dug into the ground on arrival and its crew became POWs. Makeshift repairs were made to the nose and forward fuselage and it was then flown to Gilze-Rijen for more work. It was apparently partly repainted with German markings and yellow undersides. The nose was temporarily covered, the makeshift repair giving the aircraft a strange appearance. Eventually the Stirling was flown to the Erprobungsstelle

test establishment at Rechlin northwest of Berlin where it was subsequently evaluated.

The aircraft definitely survived until at least September 1943, when it was photographed at a major exhibition at Rechlin of new Luftwaffe types and captured Allied aircraft. By then it had apparently had its nose partly repaired but was missing engines. What happened to it has not been confirmed.

During the Allies' efforts to help the Soviet Union in its fight against Nazi Germany, a number of British aircraft types were supplied for Soviet service and played an important part in the eventual Soviet victory in what the Russians continue to call the 'Great Patriotic War'. Others only reached the evaluation stage. Of the latter, a unique example was Stirling Mk.III LK615. It was the only British heavy bomber ever to be officially passed to the Soviet Union.

After arrival, this Stirling was tested at the LII VVS evaluation and trials establishment at Kratovo. Soviet test pilots were not particularly impressed.



ABOVE: The rather cramped but functional Stirling flight deck. The cockpit sat high above the ground, providing a challenge for those meeting the type for the first time

By 1944 the Soviets were much more interested in the Avro Lancaster, but this also never flew operationally in Soviet colours. No further Stirlings are known to have been tested in the Soviet Union.

Planned refinement

The Stirling's manufacturer examined several potential more powerful and improved derivatives of the basic bomber layout. To meet Specification B.1/39, a developed Stirling concept with Shorts' preferred extended wing span was proposed, but did not go ahead. Later, a so-called 'Super Stirling' was suggested, to Specification B.8/41. This

would have been powered by Bristol Centaurus engines with an impressive 4,000 miles range. Although a very viable plan, increased Lancaster production was eventually officially preferred.

Civil mysteries

Shorts recognised the potential of the Stirling as a post-war civil transport, so a Stirling Mk.V, PJ958, was specifically converted at Belfast as the S.37 with a special interior to airliner standards for up to 30 passengers in the hope that it would be the prototype for orders from civil airlines.

Known in some sources as the 'Silver Stirling', the

aircraft made an attractive sight in its natural metal finish and well-appointed interior, but it did not attract interest from potential operators. Instead, at least nine Stirling Mk.Vs were flown post-war in Belgium by Belgian passenger and freight operator Trans-Air. They were later painted with the titles of Air Transport and flew from Brussels-Melsbroek airfield, among other locations, on a variety of routes. Key were operations to China, benefiting from the Stirling's known long-range capabilities (even so, several stops for fuel were needed on such a far-flung venture). These aircraft were ex-RAF machines, converted by Airtech Ltd of Thame before delivery.

Tragically one of the Belgian Stirlings, OO-XAC, crashed in China. The official date was December 23, 1947, with the aircraft recorded as registered to Air Transport. The Stirling is believed to have been formerly Mk.V PK172, and was carrying Belgian missionaries. According to the official crash report, the aircraft had a multiple failure of three of the four engines as it climbed out of Kunming airfield following take-off. Of the 30

people aboard, 25 were killed including the four crew.

There was subsequently a twist in the tale of the Belgian Stirlings. Several of these transports were purchased clandestinely by a mysterious company named Tangiers Charter. Five had their Belgian registrations cancelled in October 1948, widely believed to have been OO-XAD, -XAE, -XAH, -XAK, and -XAL, while a sixth aircraft OO-XAS, which did not appear to serve in Belgium, was also apparently involved. Some if not all of these six Stirlings were next seen in Egypt, painted in Egyptian military markings with military serial numbers. It seems they were duly used as transports during the on-going war between Egypt and Israel, which was part of that wider regional conflict of 1947-49. Some reports state that they were used as makeshift bombers additional to their transport duties.

Company documents say that total Stirling production was 2,382 from the several centres that built this big aircraft, but some were destroyed while being manufactured or completed, giving a total of 2,371 built and flown. **FP**

Showing its distinctive nose contours, this Stirling Mk.V transport, PK124/Q was operated by 51 Squadron. It was photographed after the war probably in India, which was an important destination for these long-range transports

