

**PROFILE
PUBLICATIONS**

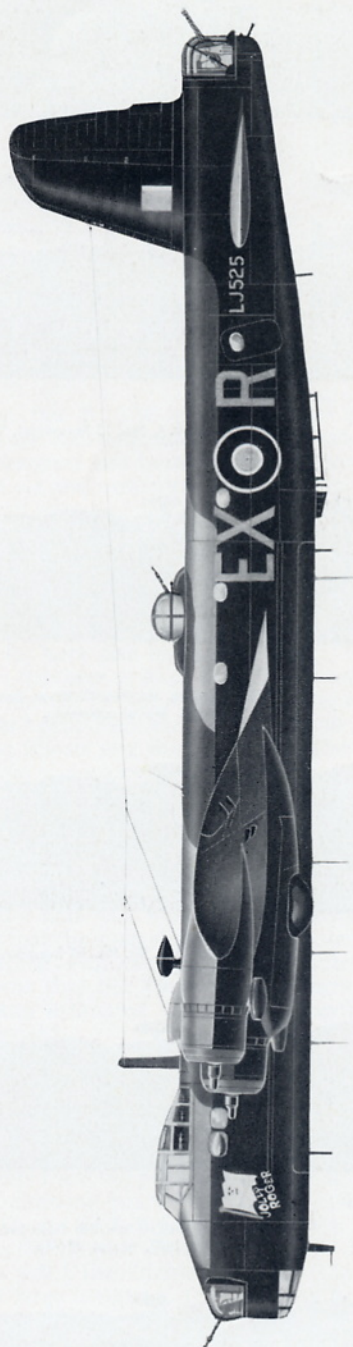
The
Short
Stirling

NUMBER 142

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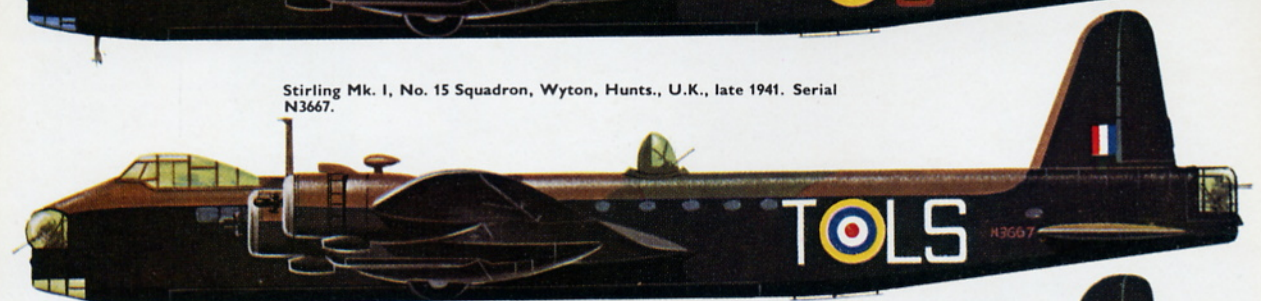
Stirling Mk. I, No. 7 Squadron, Oakington, Cambs., U.K., July 1941. Serial N3641.



Stirling Mk. I, No. 7 Squadron, Oakington, Cambs., U.K., 1942. Serial N3706.



Stirling Mk. I, No. 15 Squadron, Wyton, Hunts., U.K., late 1941. Serial N3667.



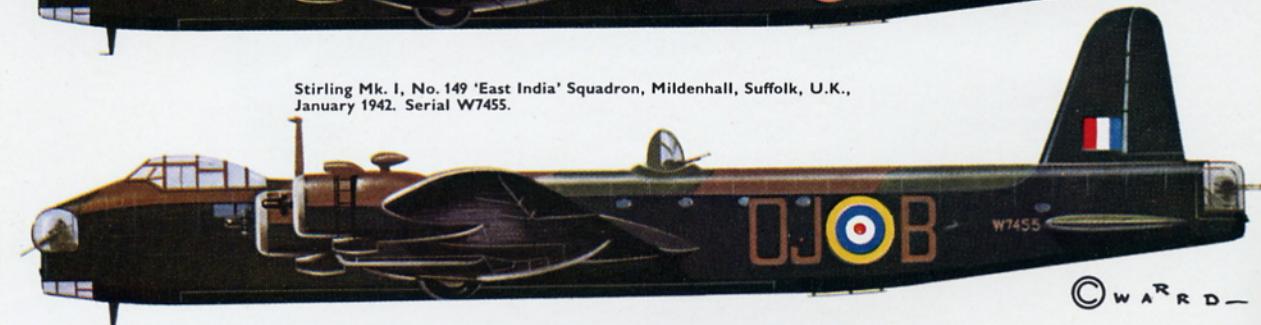
Stirling Mk. III, No. 75 'New Zealand' Squadron, Newmarket, Suffolk, U.K., 1943. Serial unknown.

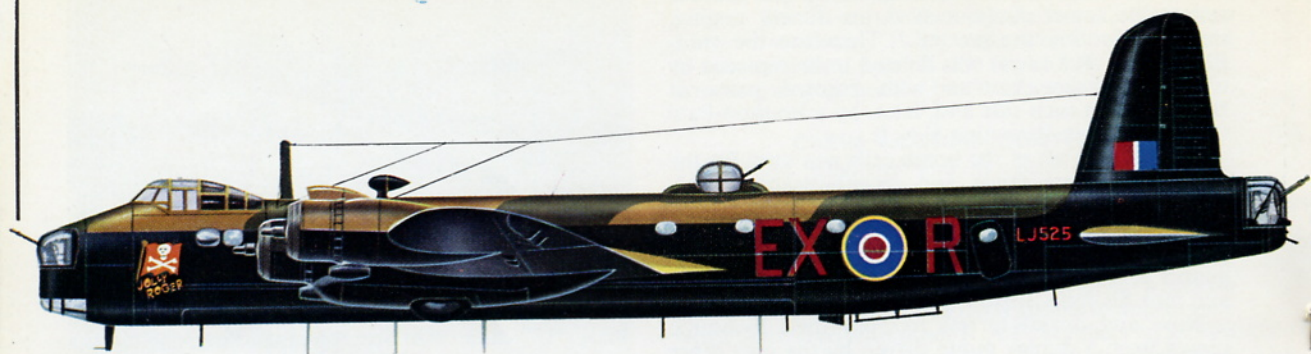


Stirling Mk. III, No. 90 Squadron, Ridgewell, Essex, U.K., 1943. Serial unknown.

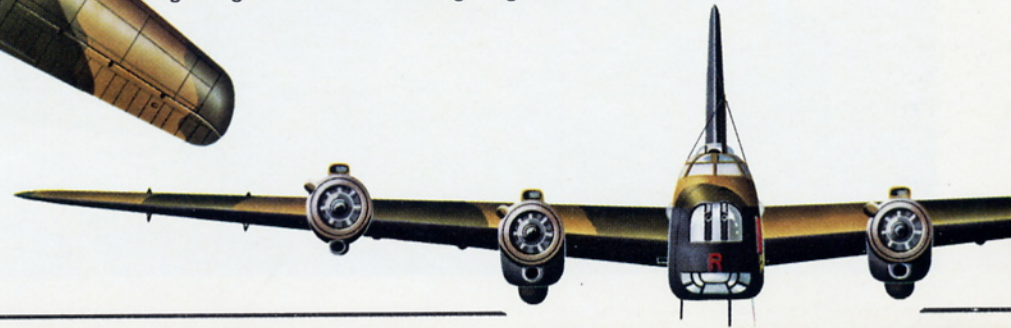


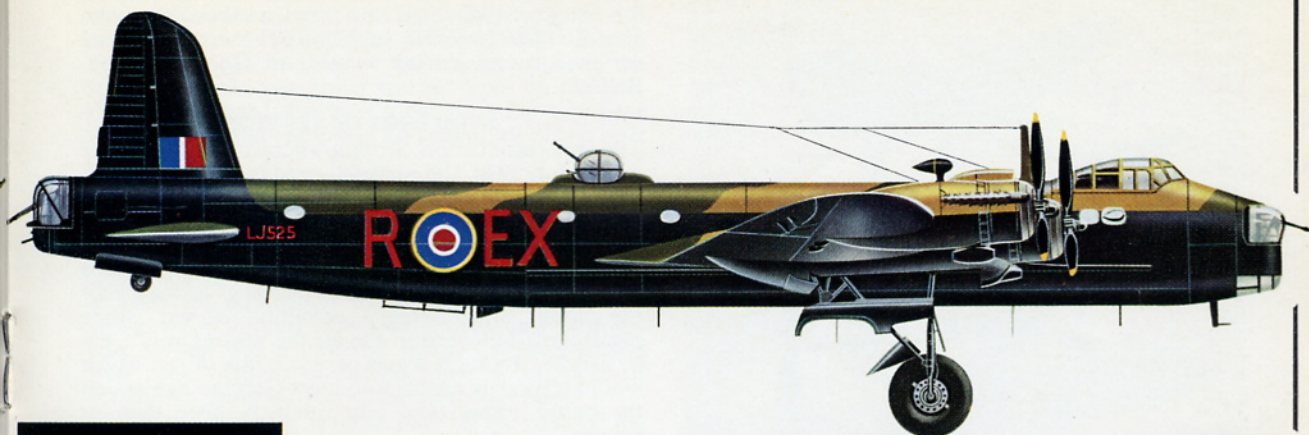
Stirling Mk. I, No. 149 'East India' Squadron, Mildenhall, Suffolk, U.K., January 1942. Serial W7455.



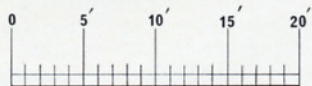
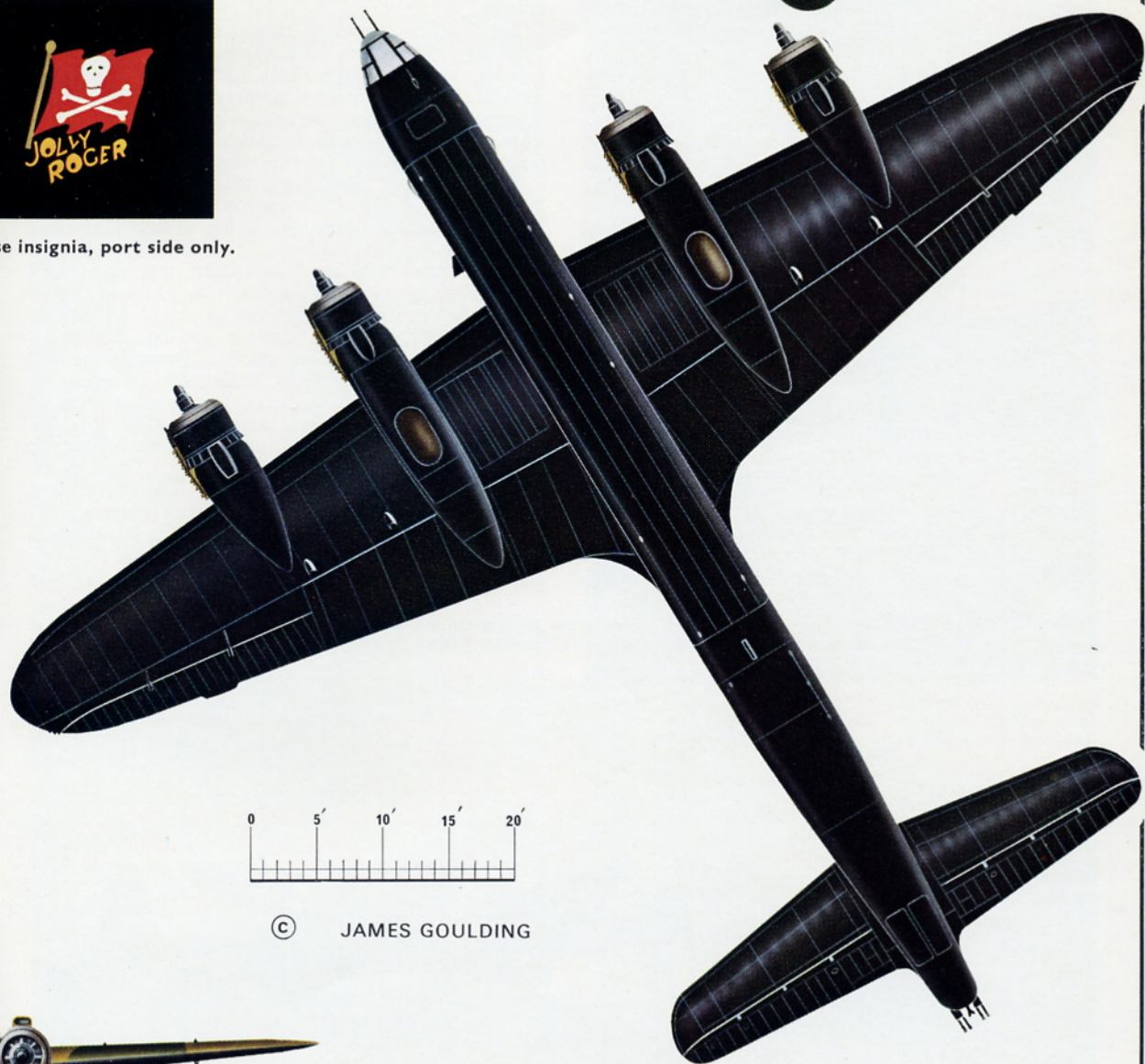


Short Stirling B. Mk. III, LJ525, "R-Roger" of No. 199 (Bomber Support) Squadron, No. 100 Group, R.A.F.; flown by Flying Officer Broadfield from R.A.F. North Creake, Norfolk, U.K., from September 1944 to February 1945. The unit was employed during this period on radio counter-measures operations, covering and simulating night bomber missions; the *Mandrel* electronic jamming device was carried to counter the German *Freya* early warning radar, and tin-foil *Window* strips were dropped to confuse *Wurzburg* fighter ground control and night fighter A.I. radar.





Nose insignia, port side only.

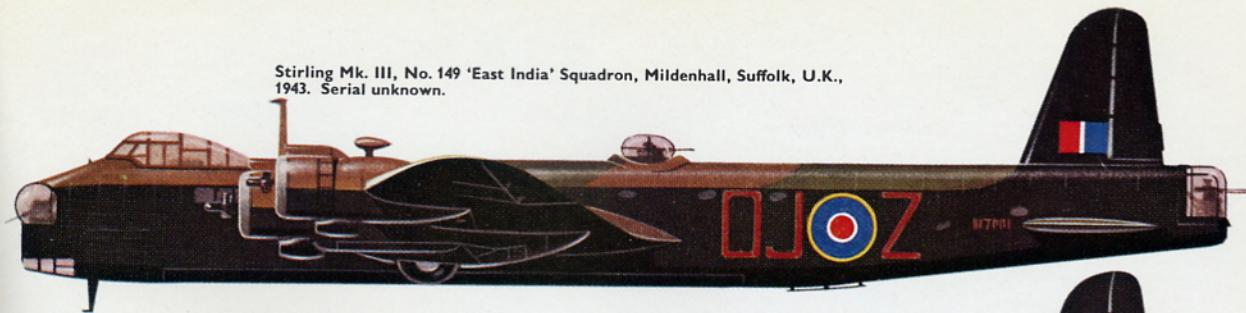


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(The publishers gratefully acknowledge the assistance of Ian C. Munro Esq., one-time Air Bomber of LJS25 "R-Roger".)

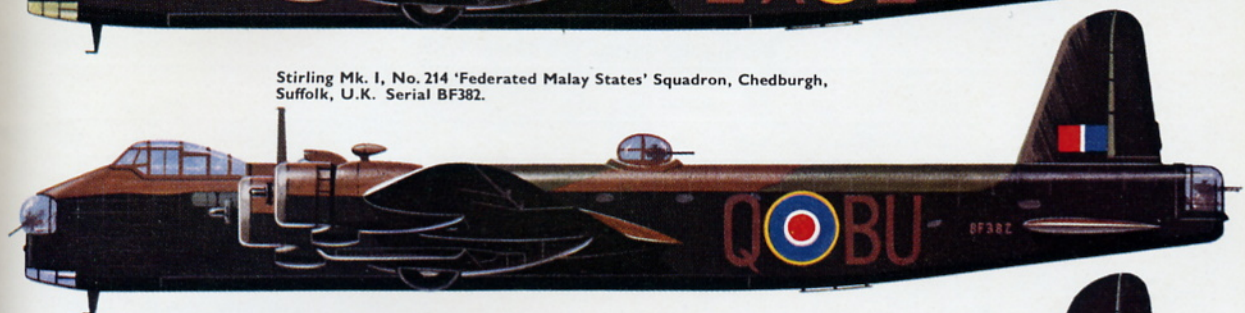
Stirling Mk. III, No. 149 'East India' Squadron, Mildenhall, Suffolk, U.K., 1943. Serial unknown.



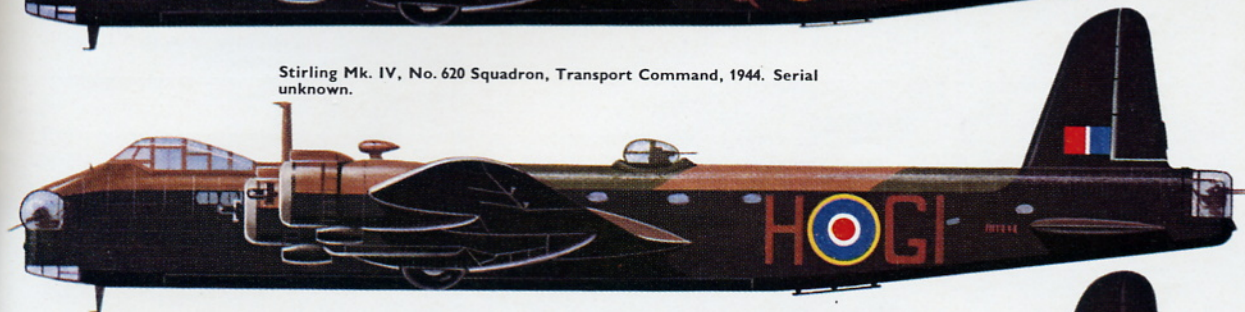
Stirling Mk. III, No. 199 Squadron, Lakenheath, Suffolk, U.K., March 1944. Serial LJ582.



Stirling Mk. I, No. 214 'Federated Malay States' Squadron, Chedburgh, Suffolk, U.K. Serial BF382.



Stirling Mk. IV, No. 620 Squadron, Transport Command, 1944. Serial unknown.

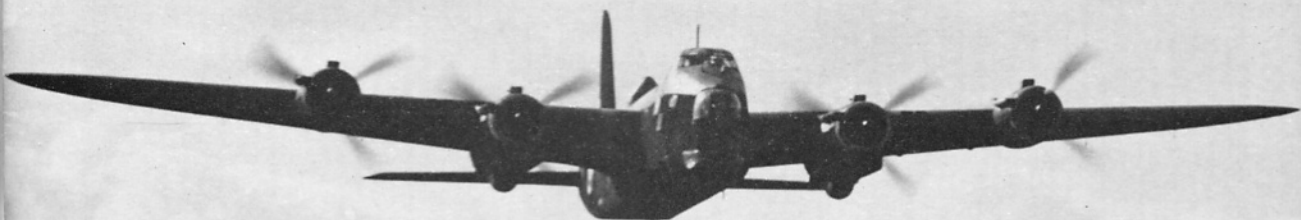


Stirling Mk. III, No. 622 Squadron, Mildenhall, Suffolk, U.K., December 1943. Serial BF321.



Stirling Mk. V, No. 242 Squadron, Transport Command, 1945. Serial unknown.





The Short Stirling

by Geoffrey Norris

The Short Stirling was the only R.A.F. aircraft of World War Two to be designed from the outset to take four engines; it was the first four-engined "heavy" to enter service; it carried bomb loads far greater than any previously contemplated; and it frequently proved more than a match even for the Bf 109. The Stirling, moreover, was a founder-member of the Pathfinder Force, soldiered gallantly through the invasion of Europe as a glider tug and transport and was still flying in the latter rôle after hostilities.

Despite all this the Stirling is still dismissed in official histories as "a disappointment"—a somewhat short-sighted verdict.

Certainly the Stirling had its problems, but virtually all of them stemmed from the blinkered thinking of the Air Ministry. Soon after it entered service, for instance, it was criticised for its inability to reach much more than 12,000 feet with a full bomb load, yet this failing was brought about entirely by Air Ministry insistence that the wing span should be no more than 100 feet so that the aircraft would fit into existing hangars. Another reason for phasing the Stirling out of the Bomber Command front line was its inability to carry anything larger than 500 lb. bombs—a point inherent in the specification to which the aircraft was built.

As a final example, the Stirling was said to be difficult to fly, which was an exaggeration. It was certainly not a forgiving aircraft during take-off because of its long undercarriage—the result of an R.A.F. request to increase the wing incidence—but once in the air it was more manoeuvrable and responsive than any other aircraft in its class and, time after time, proved its ability to get back to base safely after suffering incredible damage.

The Stirling was built to Specification B.12/36 conceived early in 1936 after yet another significant increase in the size of the expanding German *Luftwaffe*. Up to this time the R.A.F. had envisaged nothing larger than a twin-engined machine for its largest

bomber, but B.12/36 now called for a high-speed, long-range four-engined strategic bomber which had to be designed and built at speed. There would be a crew of six and armament was to comprise multi-gun turrets in nose and tail and a ventral turret to guard against under-belly attacks. The largest stores to be carried by the aircraft were 2,000 lb. armour-piercing bombs or normal 500 lb. bombs, and normal all-up weight was to be 48,000 lb. An "increased" weight of 53,000 lb. and a "maximum overload weight" of 65,000 lb. were also envisaged.

Short Brothers at Rochester, Supermarine Aviation Works and Sir W. G. Armstrong Whitworth Aircraft submitted proposals and instructions to proceed were given to Shorts and Supermarine. The Supermarine prototype was eventually damaged in an air raid and never went into production.

Shorts' initial proposal was for a bomber with a wing similar to that of the successful Sunderland and spanning 112 feet to give a good high-altitude performance. It was at this stage that the Air Ministry drove the first nail into the Stirling's coffin by decreeing that the span should be no more than 100 feet to conform with existing hangar dimensions. The result was that the Stirling's wing grew shorter and wider and estimated high-altitude performance had to be revised.

The new design was accepted and two prototypes were ordered under contract number 672299/37. Shortly after there came a further report of an increase in *Luftwaffe* strength and the Air Ministry decided to place production orders without waiting for flight test results from the prototypes. This amounted to an "off-the-drawing-board" order, an emergency with which Shorts had already successfully coped when building the Empire Class flying boats. Nevertheless, this was still a formidable challenge: the bomber was the first large landplane the company had built since the Scylla and Syrix of 1934, and their first ever with a retractable undercarriage.

THE WOODEN STIRLING

Following a practice successfully established with the Empire boats when the four-engined Scion Senior was used as a small-scale aerodynamic prototype, Shorts built a half-scale wooden Stirling at their

Above: *Short Stirling Mk. I in flight; the first of the R.A.F.'s four-engined "heavies" to enter service, the Stirling I made its operational debut in a raid on Rotterdam oil storage facilities on the night of 10th February, 1941. (Unless otherwise indicated, all photographs appearing in this Profile are provided by Short Bros. & Harland Ltd.)*



Rare flying view of the S.31. Powered by four 90 h.p. Pobjoy Niagaras, the "mini-Stirling" made its maiden flight on 19th September 1938, in great secrecy; the pilot was John Lankester Parker.

Rochester factory. This was the S.31, a fairly faithful miniature of the full-sized aircraft accommodating a pilot and observer in tandem. Slipstream effects were realistically reproduced, a retractable undercarriage was fitted and bomb doors could be opened to give an idea of their effect on the full-size aircraft. The S.31 used a wing which was derived from that of the Scion Senior and was powered by four Pobjoy Niagara III seven-cylinder engines each developing 90 h.p. The maiden flight was made by Shorts' Chief Test Pilot, John Lankester Parker, from Rochester Airport on 19th September 1938, and was an occasion of great secrecy.

Early test flights with the S.31 convinced Lankester Parker that the basic concept was good and on 21st October he flew the machine to the Aeroplane and Armament Experimental Establishment at Martlesham Heath where military test pilots were equally impressed by the aircraft's handling properties. They asked, however, for an improvement in take-off performance as they could visualise a considerable increase in the all-up-weight of the full-sized aircraft

as military demands became greater. Their precise recommendation was for an increase of three degrees in the wing incidence which had been set at the optimum of $3\frac{1}{2}$ degrees for minimum cruise drag.

Unfortunately work on the Stirling production line had, by this time, reached a stage where such a modification was out of the question for reasons of both time and money; so Shorts adopted a compromise solution of increasing the ground angle by three degrees through lengthening the undercarriage. This modification was also incorporated into the S.31 which, at the end of 1938, was re-engined with Pobjoy Niagara IVs which each developed 115 h.p.

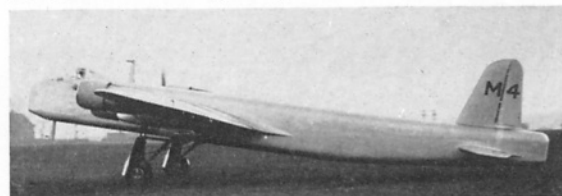
Trials of the S.31 revealed no need for further major modifications. There was some control difficulty with an aft c.g. and horn-balanced elevators were fitted. These were, in turn, replaced by a larger tailplane with normal elevators.

As the last of the minor aerodynamic difficulties were being ironed out of the S.31 during the first months of 1939, so the construction of the two full-scale prototypes, L7600 and L7605, was nearing completion. Lankester Parker took L7600 into the air for the first time on 14th May 1939, and the aircraft handled satisfactorily throughout the twenty-minute test. Then came an incredible stroke of bad luck. As the Stirling landed one brake seized and the stalky undercarriage collapsed. The resulting damage caused the aircraft to be written off.

This was a set-back to the entire Stirling programme. The undercarriage was redesigned and strengthened but L7605 was not ready for flight testing until 3rd December 1939, when it made a successful half hour sortie with the undercarriage locked down. A second flight was made on Christmas Eve when the wheels were retracted and trials proceeded satisfactorily from then on. The maiden flight of N3635, the first production aircraft, took place five months later on 7th May.

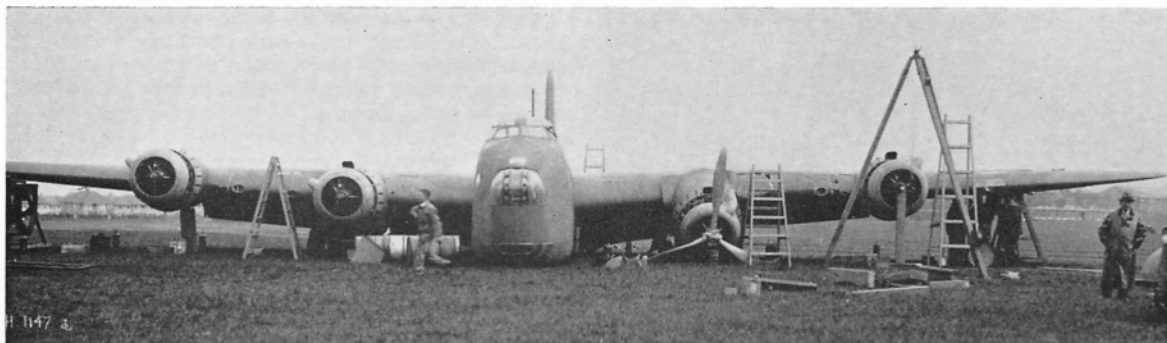
STIRLING CONSTRUCTION

The Stirling I was a mid-wing cantilever monoplane powered by four Bristol Hercules engines. Its wing



The half-scale wooden S.31 prototype in its pre-war colours.
The S.31 in warpaint.





The end of the Stirling prototype's maiden flight; L7600 betrayed by a binding brake, on 14th May 1939.

structure owed much to that of the Empire Class flying boats and was basically of two-spar construction covered by aluminium alloy sheet flush-riveted to the spars and rib members. The Stirling differed from the flying boats by having lattice-braced ribs for torsion box bracing in the spar truss. Gouge-type trailing edge flaps were used and these were equal to 48 per cent. of the wing chord.

Space within the wing was well utilised for fuel tanks: four large tanks were housed inside the spar truss, two between the spar and the flap shroud and one in the wing root leading edge, to give a total fixed fuel capacity of 2,254 gallons. All tanks were self-sealing except those in the wing root leading edges

which were used only for maximum-range sorties and which were emptied immediately after take-off. The fixed tankage could be augmented by six ferry tanks carried in the wing bomb cells to increase available fuel by 220 gallons.

The Mark I Series I Stirlings used Hercules II engines in full monocoque nacelles; but when the Hercules XI became available Shorts redesigned the power units to incorporate engine mountings of welded tube framework for a version known as the Mark I Series II. Complete Bristol-designed power units became available later and all subsequent Mark I Stirlings were known as the Series III.

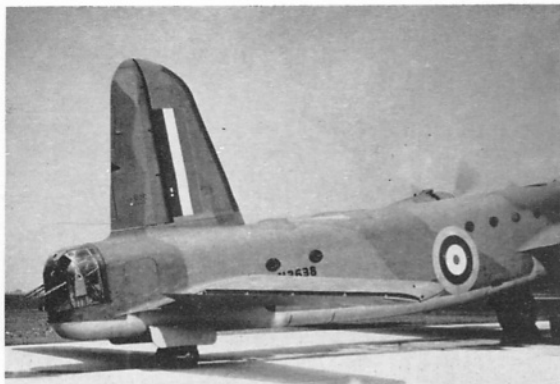
The Hercules XI was a fourteen-cylinder double



Second prototype Stirling L7605, with strengthened undercarriage.

N3635, the first production aircraft from Rochester.





Tail assembly and turret of fourth production Mk. I aircraft from Rochester.

row radial air-cooled engine which developed 1,590 b.h.p. at 2,900 r.p.m. for take-off and 1,020 b.h.p. at 2,500 r.p.m. for maximum economical cruise. Hydraulic throttle controls were used and these were a cause of constant irritation. Inherent lag in the unpressurised liquid column through which throttle lever movement was transmitted to the engine could often cause a significant time lag and it was sometimes possible to move the lever fully forward without any change in the engine note. Cavitation in the Exactor control could also cause an engine to cut at embarrassing moments such as take-off.

The Stirling fuselage was a complete break from the ship-building methods which were still applicable to flying boats at that time. It was built in four separate sections and frames within each section were joined by continuous stringers instead of stringers interrupted at every frame which had for a long time been normal practice at Shorts. The four sections were finally joined together by tension bolts through the webs of the end frames.

The lower sides of the centre-section spar booms coincided with the aircraft's main deck, which was carried on three large longitudinal girders which

formed the three parallel bomb cells, each 42 feet long. The bomb cells were further divided into compartments only 19 in. wide, which was sufficient to accommodate normal 500 lb. bombs or 2,000 lb. armour-piercing bombs but nothing larger.

CREW ACCOMMODATION

The Flight Engineer and Wireless Operator were housed in a cabin just forward of the wing leading edge and forward of them was the Navigator's station. The two pilots had a full-glazed flight deck just level with the forward end of the bomb cells. The provision of a separate Flight Engineer's station meant that the cockpit was fairly simple in appearance when compared with other R.A.F. bombers in service at the beginning of the war. The auto-pilot panel and a P.4 compass were to the left of the First Pilot who had the standard flying instruments plus a standard beam approach indicator and a DF visual loop indicator. A slim panel running up the centre of the windscreen between the pilots contained flap switches and position indicators and the master fuel cocks were in the roof above this. Throttle and mixture controls were normally placed between the two pilots and the only engine instruments on the flight deck were boost gauges and engine speed indicators. The bomb-aimer occupied a prone position in the nose below the flight deck and was provided with camera and drift sight and an autopilot steering control. Just above him was the twin-Browning F.N.5 front turret.

The wing centre-section cut across the fuselage just aft of the Wireless Operator's position and the space above this was used for the storage of oxygen bottles while below it was a rest bunk. From there the deck floor ran aft more or less uninterrupted for the full length of the bomb cells to a point where the first few Stirlings off the Rochester line carried the ventral turret demanded by the Specification. The realisation that the ventral turret would be lowered whenever the Stirling was under attack and would therefore decrease airspeed at the very time maximum speed was needed, coincided with the discovery that non-

Three Mk. I's in formation over the English countryside. Towards the end of 1941, Stirlings were frequently used on daylight "Circuses"—combined fighter/bomber sweeps over occupied Europe. (Photo: Heinz J. Nowarra)



return hydraulic valves frequently leaked and that the retractable turret could inch down during taxiing, the guns fouling the ground. Therefore the twin-Browning F.N.5 turret was deleted to be replaced by temporary beam hatches with pivoted pairs of Brownings on each side and, later, by a Boulton-Paul turret with twin-Browning F.N.7s.

The fuselage aft of the bomb cells was used for the storage of flame floats and reconnaissance flares, incorporating the escape hatch in the floor and a crew entry door on the port side. Aft of this again was the lavatory beside the ladder which enabled the rear gunner to clamber up over the tail wheel compartment and into his four-Browning F.N.20A turret.

Nose and dorsal turrets received their hydraulic power from a duplex pump driven by the port inner engine while the rear turret was powered by a single pump in the starboard inner engine. Pulsations in the hydraulic power were smoothed out by recuperators and those for the dorsal and rear turrets were positioned in the fuselage just level with the roundels painted on the outside. This fact was soon discovered by German fighter pilots who came to realise that a few well-aimed bursts towards the target-like roundels could put two turrets out of action; and so these two recuperators were moved to a less vulnerable position.

PRODUCTION ORDERS

The initial production order for 100 aircraft was placed with Short Brothers at Rochester and was followed fairly quickly by a further order of 100 placed with Short and Harland, the new factory which had opened in Belfast, Northern Ireland and which was completing an order for Bristol Bombs



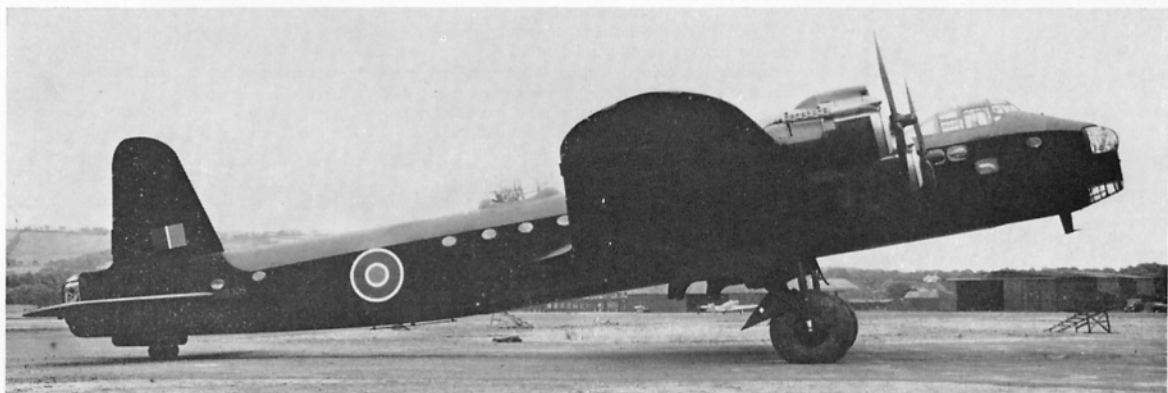
The first Belfast-built Mk. I, N6000.

and Handley Page Herefords. After the Munich crisis of 1939 the Ministry of Aircraft Production's Plan "L" came into force and Stirling production orders were increased to 1,500 aircraft. Contracts at Rochester and Belfast were extended and new contracts placed with Austin Motors at Longbridge, and with Rootes, who had a new shadow factory at Stoke-on-Trent. Soon Stirlings were being built in some twenty factories, and although the component breakdown inherent in the design of the aircraft lent itself to this practice, strict supervision was necessary. Shorts, together with the M.A.P., set up a mobile group of 600 production engineers and draughtsmen whose task it was to travel the length of England—and across to Northern Ireland—to co-ordinate this dispersed production of the bomber.

Even so, initial production was disappointingly slow. There were inevitable delays in delivery of machine tools and in components using forgings and extrusions. On top of this Lord Beaverbrook, the newly-appointed Minister of Aircraft Production, ordered a switch of priority from four-engined bombers to



Belfast-built Stirling Mk. I Series III, with twin-Browning F.N.7 dorsal turret; and (below): Mk. I Series III with later-style turret.

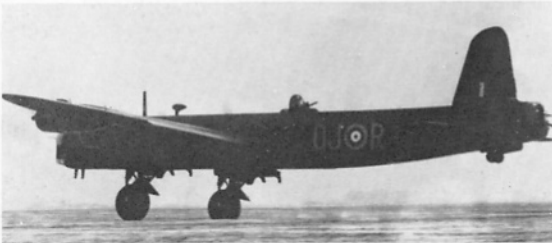




Stirling Mk. I, MG-D, N3641; the seventh production aircraft in service with No. 7 Squadron at Oakington in summer 1941. (Photo: Imp. War Mus. CH3145)



An Austin-built Mk. I, W7455, in the markings of No. 149 Sqn. A fact which the Luftwaffe was quick to exploit was the initial location of the hydraulic recuperators for dorsal and rear turret operation systems in the fuselage immediately behind the R.A.F. roundel marking—a perfect target. (Photo: "The Aeroplane")



Another 149 Squadron machine "tail-up". (Photo: "The Aeroplane")

fighters and twin-engined machines to cover losses in what was later to be known as the Battle of Britain. The *Luftwaffe* also played its part in delaying production: six completed Stirlings, N3645 and N3647-

Stirlings of No. 15 Sqn.; the nearest machine is N3675, one of the 260 original Rochester-built aircraft. The machine in the air is "MacRoberts' Reply", the Stirling bought for the R.A.F. by Lady MacRobert after the death of her three airmen sons, two of them in combat. (Photo: via P. J. R. Moyes)



N3651, were destroyed in an air raid on Rochester on 9th August 1940; and less than a week later five aircraft (N6025-N6028 and N6031) were destroyed on the ground during a raid on Queen's Island, Belfast.

STIRLINGS IN SERVICE

The first production Stirling aircraft left Rochester during July 1940, and were delivered to No. 7 Squadron at Leeming in August. The R.A.F. pilots spent a four-month working-up period getting to know their new machines. The lag in the throttle controls allied with a tendency to swing on take-off if the throttles were not handled with the utmost delicacy—a legacy of the long undercarriage—certainly caused some headaches; but once in the air the Stirling was a joy to handle. Its short wings gave it a rate of roll which would obviously enable it to meet German fighters on far better terms than any other bomber then in service.

No. 7's first operation came on the night of 10th February 1941, when three Stirlings led by Squadron Leader Griffiths-Jones took off from Oakington airfield. Each aircraft was carrying sixteen 500 lb. bombs to be dropped on oil storage tanks at Rotterdam. It was a smooth operation and all the bombs were dropped except for two which hung up.

By the end of 1941 more than 150 Stirlings had been built and No. 15 Squadron at Wyton and No. 149 at Mildenhall were also flying as heavy bomber units with the new aircraft. The Stirling was used both for night raids and for daylight operations; and the efficient way in which it could stand up to enemy fighters led to its increasing use in combined fighter/bomber sweeps across Europe during daylight—the so-called "Circus" operations. Towards the end of the year some Stirlings under the direction of Group Captain D. C. T. Bennett were using some of the first target indicators, and soon after this the R.A.F.'s first four-engined heavy became a founder member of the new Pathfinder Force. There is no doubt that 1942 was "Stirling year". The aircraft was giving plenty of punishment to the Germans, and was also proving that it could itself take punishment to an incredible extent. An aircraft flown by Pilot Officer J. Trench in an attack on Dusseldorf was badly

hit during its run up to the target. Although it was obvious that the aircraft was badly damaged, Trench managed to hold it steady until the bombs had been delivered. Then he assessed the damage. One of the starboard tanks was holed and oil pipes on the port side were severed, the port inner propeller and gear were missing and there was no sign at all of the port outer engine.

They turned with difficulty onto the homewards heading and lost height steadily over the North Sea. As the English coast passed below so the inner starboard engine cut and there was no alternative to an immediate forced landing, as the aircraft was already too low for parachutes to be used safely. Trench brought the aircraft down in a field near Weeley. The Stirling was a write-off but it had brought its crew back virtually unscathed when by the laws of gravity it should have crashed over Germany.

Stirlings played a leading part in the first of the 1,000 bomber raids and again proved how they could both give and take punishment. On a night in June, 1942 Sergeant F. M. Griggs was piloting a No. 218 Squadron Stirling when he was attacked by two night fighters while crossing the Dutch coast on the return flight. Both German aircraft attacked simultaneously and inflicted heavy damage to the Stirling. One engine was lost, the radio ceased to function, the rear-gunner was killed and the wireless operator wounded. Nevertheless the front and dorsal gunners put up a spirited defence which drove one of the two fighters away. The second enemy aircraft was hit and seen to crash into the sea.

Struggling along on three engines Griggs reached the Dutch coast when the navigator spotted two more night fighters. The inter-com was not working and the navigator had to run the length of the fuselage, to where the front gunner was giving first aid to the wireless operator, to give the alarm. In a short but bitter skirmish both enemy aircraft were hit and seen to crash.

But the night's adventures were not yet over for Griggs. While manoeuvring to avoid the attention of flak ships he lost control of the aircraft and only levelled out a few feet above the North Sea. One of his three remaining engines burst into flames as he was crossing the English coast but a safe landing was made on an airfield.

One Stirling flown by Flight Lieutenant G. Turner of No. 75 Squadron survived a head-on collision with a Bf 109 over Hamburg and returned safely with four feet of its starboard wing missing; while another pilot from the same squadron, Pilot Officer Buck, brought his aircraft back with heavy damage which included the loss of one engine and the complete rudder.

STIRLING V.C.s

Many deeds of valour were performed by men flying Stirlings but the names of two have passed into history—those of Flight Sergeants G. H. Middleton and A. L. Aaron.

On the night of 28th November 1942, Middleton was flying Stirling BF372 of No. 149 Squadron in an attack on the Fiat works at Turin. A shell exploded inside the cockpit while the aircraft was over the target and Middleton was badly wounded in the face; he lost an eye and received other wounds in his body and legs. He lost consciousness for a while and his co-pilot, Flight Sergeant Hyder, carried out the attack. When Middleton regained consciousness he insisted that Hyder should relinquish the controls to

get his own wounds dressed. Then, although Middleton could only speak at the cost of loss of blood, he personally directed the hazardous flight back to England. The aircraft was virtually out of fuel when the coast was reached and Middleton ordered the

Note the characteristic twin tail-wheels of this 15 Sqn. aircraft.
(Photo: Imp. War Mus. CH3949)

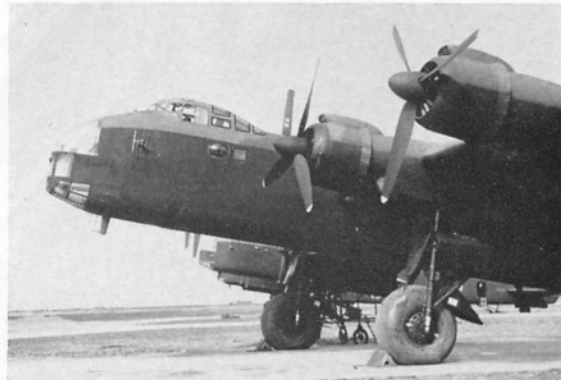


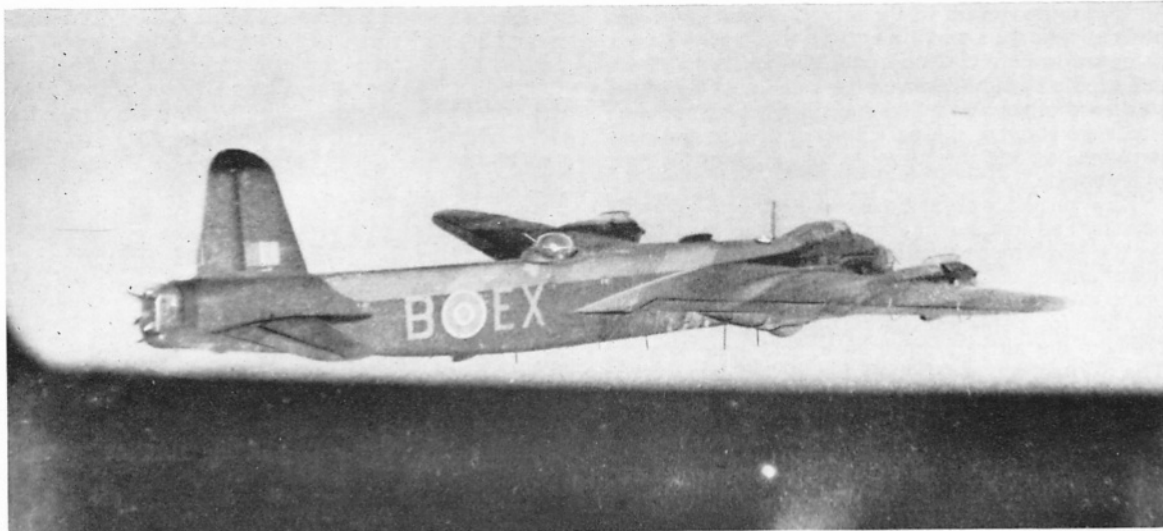
Above: *Mk. I Srs. III in flight.*

Below: *Fine study of a Belfast-built Stirling Mk. III.*



Nose details of the Stirling Mk. IV, built as a transport and glider-tug. The glider-tug version saw service in the large-scale operations by British airborne troops in the invasion of Normandy and at Arnhem.





A photograph of moderate quality but great historical interest; EX-B "Beer" of No. 199 Squadron, a radio-countermeasures Stirling Mk. III. The aircraft, photographed from another squadron machine while in flight over France, carries the Mandrel jamming device and chutes for dropping Window. As a bomber support unit, the squadron accompanied the Halifaxes and Lancasters of Bomber Command on night raids, and with the aid of Window made "spoof" raids, decoying German night defences from the major assaults elsewhere. (Photo: courtesy Ian C. Munro)

crew to take to their parachutes. Sergeant Mackie and Sergeant Jeffery, front gunner and engineer respectively, stayed to help Middleton; but the Stirling crashed into the sea before these three could escape.

On the night of 12th August 1943, during another raid on Turin, Flight Sergeant Aaron was critically wounded while piloting EF452 of No. 218 Squadron. His jaw was smashed, part of his face torn away, a lung perforated and his right arm broken. Despite his injuries he refused to rest and personally directed his flight engineer who was acting as co-pilot in a flight to Bone airfield, North Africa. The aircraft made a safe landing but Aaron died from exhaustion nine hours later.

The names of both Aaron and Middleton now appear on the list of holders of the Victoria Cross.

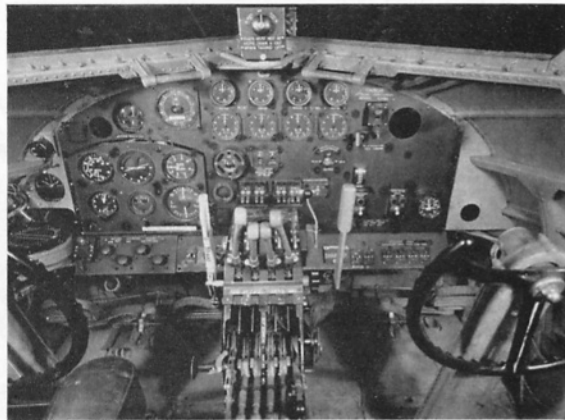
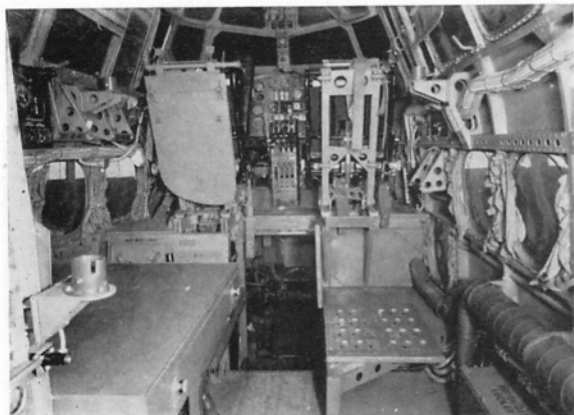
STIRLING DEVELOPMENT

During 1943, the Stirlings began to give way to Lancasters and Halifaxes as front line aircraft; but development continued. A decision to build the

Stirling in Canada was taken in 1941 and a contract for 140 aircraft was placed. These were to be powered by the 1,600 h.p. Wright Cyclone R-2600-A5B engine and two prototypes of the Stirling II, as the variant was to be known, were converted from N3657 and N3711, both originally Mark I's. The contract was subsequently cancelled and the Mark II never entered production. The final bomber variant was to be the Mark III; and during 1942 two Austin-built aircraft, BK648 and BK649, were set aside as prototypes. They were fitted with Hercules XVI powerplants with underslung oil coolers. Available power was now 1,635 per engine and speed was increased to 270 m.p.h. at 14,500 feet.

Contracts at Rochester, Belfast, Longbridge and South Marston (one of the shadow factories to which Rochester production had been switched following air raids in 1940) were changed to call for Mark III aircraft, which apart from the powerplants were generally similar to the Mark I Series III. Minor differences were the fitting of the improved F.N.50 dorsal turret used in the Lancaster (and on some

Flight deck and bomb-aimer's compartment of a Mk. III; and (right): flight instruments of Mk. III and Mk. IV variants. Bomb door controls were retained even in transport versions.





LJ525, "Jolly Roger" of No. 199 Sqn. on its dispersal at R.A.F. North Creeke; this aircraft is the subject of the five-aspect painting on pp.8 and 9 of this Profile. (Photo: courtesy Ian C. Munro)

Mark I Series III Stirlings), larger fuel tanks and a revised interior layout with fewer windows in the rear fuselage. Stirling III's were used to re-equip the four existing Stirling squadrons, and were also delivered to nine other squadrons.

A vastly improved Stirling design had been suggested by Shorts even before the start of the war when they entered their S.34 design to Specification B.1/39. This aircraft had a larger wing span, a modified fuselage with dorsal and ventral turrets each housing four 20-mm. Hispano cannon, and was powered by the high-altitude Hercules 17SM engine, but this design was not accepted by the Air Ministry.

Another suggestion, this time for a "Super Stirling", was made in 1941 when Shorts entered their S.36 design for Specification B.8/41. The S.36 was to have a wing spanning 135 ft. 9 in. and was to use Bristol Centaurus engines. Gross weight was to have been 104,000 lb. and the estimated range was 4,000 miles at 300 m.p.h. carrying a 10,000 lb. bomb load. The Air Staff found this proposition attractive but eventually decided against it in favour of increased Lancaster production.

Thus there was no second generation Stirling to take over from the Marks I and III; but it says much for the general soundness of the aircraft's design that it was to continue in production until the end of the war. During 1943 two Rochester-built aircraft, EF506 and LJ512, were converted from Mark III's to prototypes for the Mark IV version which was to serve as a transport and glider-tug. The glider tug version had both nose and dorsal turrets removed

PK237, a Mk. IV, was the 1,000th aircraft built by Short & Harland at Belfast.



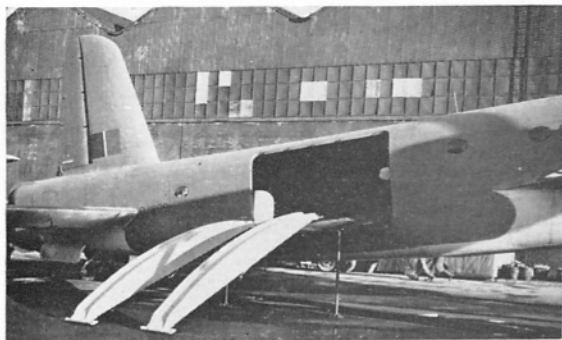
and some versions were built without tail turrets. The glider towing coupling was installed on a stirrup built round the tail. The paratroop version had a glazed cupola instead of the tail turret and a large paratroop exit hatch was built into the aft fuselage just behind the bomb cells. There was no basic difference between the Mark IV and the Mark III. Both Mark IV prototypes were flown during the summer of 1943.

After successful acceptance trials both new versions replaced the Mark III's on the production line and first deliveries were made to the R.A.F. during the last quarter of 1943. Stirling IV's were cleared to tow one Hamilcar or as many as five Horsa gliders. They were in action with Nos. 196, 190, 299 and 622 Squadrons during the invasion of Normandy, taking part in the Arnhem and Nijmegen operations and in the crossing of the Rhine.

The final Stirling variant, the Mark V, appeared during 1944. LJ530 was taken from the Rochester production line to be the prototype of an aircraft designed specifically as a personnel, cargo or vehicle transport which carried no armament. The nose was extended and designed to hinge open for the loading of cargo and a large cargo door was built into the rear of the starboard fuselage. The Stirling V carried a crew of five and could accommodate 40 passengers, 20 fully-equipped paratroops, twelve stretchers plus fourteen sitting casualties, two jeeps with trailers, or one jeep with a 6-pounder field gun, trailer and crew. Production of this version was entrusted to Short and Harland in Belfast who received an order for 160 aircraft. The Mark V first entered service with No. 46 Squadron at Stoney Cross in January, 1945 and then began to replace other transport types in other units of Transport Command, playing a leading part in the build-up of forces for the projected invasion of Japan.

CIVIL MARKET HOPES

With an eye towards possible civil markets Shorts converted one Mark V to civilian transport standards. This was design S.37, the so-called "Silver Stirling", a fully-furnished and insulated transport for up to



Detail of the rear loading door of a Mk. V, with ramps in place.

STIRLING BOMBER SQUADRONS

MARK I		
Sqdn.	Unit Markings	Representative Aircraft
7	MG	N3641 'D', N3680 'Y'
15	LS	N3667 'T', N3757 'G'
75	AA	N3683
90	WP	R9271 'Q', W7627 'A'
149	OJ	R9142 'B', W7582 'S', W7453 'O'
214	BU	W7584 'D', R9198 'M'
218	HA	R9203 'D', R9241 'L', R9313 'Q'
MARK III		
Sqdn.	Unit Markings	Representative Aircraft
7	MG	BF532 'Y', BK724 'I', BK621 'Q'
15	LS	BF740 'G', BF475 'T', EF333 'X'
75	AA	BK770, BK777, BK809
90	WP	BK665 'D', BK784 'M'
149	OJ	EH943 'B', EH982 'S', EJ124 'C'
196	ZO	EE975, EF114
199	EX	EH934 'K', EJ115 'C'
214	BU	EH895 'M', EH977 'Q'
218	HA	EH887 'Z', EJ112 'Q'
622	GI	EH921 'L', EJ113 'Q', LJ444 'A'
623	IC	EH878 'I', EJ121 'Q', LJ454 'E'

Stirling MK. IV aircraft served with Nos. 138, 161, 171, 196, 295, 299, 570 and 600 Squadrons.

Stirling MK. V aircraft served in Nos. 46, 48, 158, 242 and 299 Squadrons.

SPECIFICATION

STIRLING I SERIES III

Dimensions: Span, 99 ft. 1 in.; length, 87 ft. 3 in.; height, 22 ft. 9 in.; wing area, 1,460 sq. ft.
Power Plant: Four Bristol Hercules XI 14-cylinder air-cooled radials developing 1,590 b.h.p. at 2,900 r.p.m. and 1,020 b.h.p. at 2,500 r.p.m. for max. economical cruise.
Weights: Empty (equipped), 46,900 lb.; normal loaded, 59,400 lb.; maximum permissible, 70,000 lb.
Performance: Maximum, 260 m.p.h. at 10,500 ft.; economical cruise, 215 m.p.h. at 15,000 ft.; time to 15,000 ft. (at max. weight), 42 mins.; range (14,000 lb. bomb load), 740 miles; with 5,000 lb. bomb load, 1,930 miles; with 1,500 lb. bomb load, 2,330 miles.
Armament: Front turret, twin-Browning F.N.5; dorsal turret, twin-Browning F.N.7; rear turret, four Browning F.N.20A guns.

STIRLING III and IV

Dimensions: As for Mark I version.
Power Plant: Four Bristol Hercules XVI developing 1,650 b.h.p. at 2,900 r.p.m.
Weights: Empty, 43,200 lb.; maximum loaded, 70,000 lb.; maximum bomb load, 14,000 lb.
Performance: Maximum speed, 270 m.p.h. at 14,500 ft.; range with 3,500 lb. bomb load, 2,010 miles; with 14,000 lb. bomb load, 590 miles.
Armament: (Mark III only). Front turret, twin-Browning F.N.5; dorsal turret, twin-Browning F.N.50; rear turret, four Browning F.N.20A.

STIRLING V

Dimensions: Span, 99 ft. 1 in.; length, 90 ft. 6-75 in.; height, 22 ft. 9 in.; wing area, 1,460 sq. ft.
Power Plant: Four Bristol Hercules XVI developing 1,650 b.h.p. at 2,900 r.p.m.
Weights: Empty, 43,500 lb.; loaded, 70,000 lb.
Performance: Maximum speed, 280 m.p.h. at 6,000 ft.; economical cruise, 233 m.p.h. at 11,000 ft.; maximum range, 3,000 miles; service ceiling, 18,000 ft.

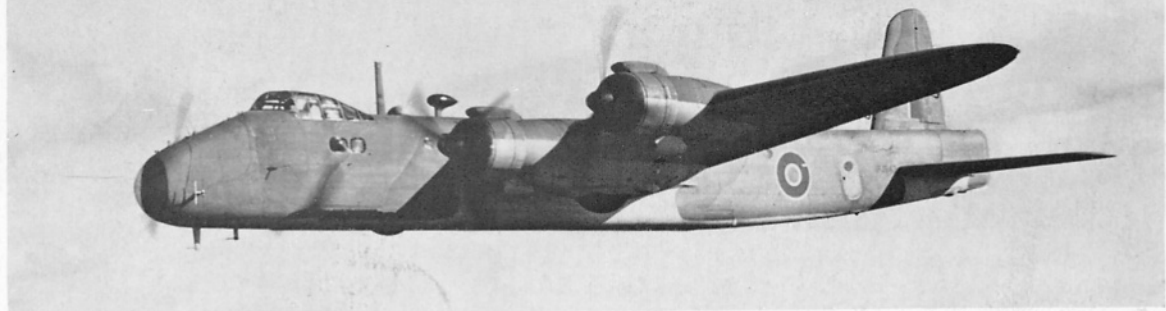
thirty passengers which was converted from PJ958 and built to the general requirements of specification C.18/43. The civil version of the Halifax proved more attractive however, and no further interest was shown in the S.37.

By 1946 the Stirlings with Transport Command were being replaced by the Avro York and large numbers were scrapped, although twelve of them escaped when they were converted to approximate S.37 standards by Airtech Limited in May, 1947. These aircraft were sold to Trans-Air, a Belgian charter operator and used on a service between Blackbushe and Shanghai. They carried the registrations OO-XAK to OO-XAV.

Over a period of six years a total of 2,382 Stirlings were built, more than half of them in Northern Ireland. They were in service with eleven bomber squadrons and made 18,440 sorties. The Stirling is often criticised for its inability to compete with the Halifax and Lancaster; but both these aircraft were second generation machines which had started their lives as twin-engined bombers.

PJ958, the "Silver Stirling" converted to civil standards from a production Mk. V. Note faired-in tail turret.





Stirling Mk. V, PJ943, in flight. The Belfast plant produced 160 Mk. V's, which were to have played a leading rôle in the projected invasion of Japan.

If Shorts had been allowed to have their way with the wing span of the Stirling, if their proposals for improved aircraft had been accepted, there would have been a lot more written about this bomber.

But even without the "ifs" it is a story which can stand against that of any other aircraft and a story which has assured the Stirling of a place among the "immortals" of World War Two.

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STIRLING PRODUCTION

Manufacturer	No. built	Serial Numbers	Remarks
Shorts, Rochester	2	L7600 and L6705	L7600 crashed on maiden flight
STIRLING MARK I Shorts, Rochester	260	N3635-3644, N3646, N3652-3684, N3700-3729, N3750-3769, DJ972-977, R9141-9170, R9184-9203, R9241-9290, EF327-369, EF384-400.	N3645, N3647-51 destroyed on ground replaced by DJ972-977
Short & Harland Belfast	261	N6000-6024, N6029-6030, N6032-6049, N6065-6104, N6120-6129, R9295-9334, R9349-9358, BF309-358, BF327-416, BF434-454.	N6025-6028, N6031 destroyed on ground. Nos. N3657, N3711 & R9188 were built as MK. II's but converted back to MK. I's.
Austin Motors	191	W7426-7475, W7500-7539, W7560-7589, W7610-7639, BK592-628, BK644-647.	
STIRLING MARK III Shorts, Rochester	276	EF401-413, EF425-470, EF488-518, LJ440-483, LJ501-529, LJ531-544, LJ557-596, LJ611-653, LJ667-670, PW255-266.	21 Aircraft converted to IV's. LJ serials 615, 618, 620, 622, 624, 627, 629, 631, 633, 636, 638, 640, 643, 645, 647, 650, 652, 667, 668 and PW255 and 257.
Short & Harland, Belfast	342	BF455-483, BF500-534, BF561-580, MZ260-264, EE871-918, EE937-975, EF114-163, EF177-217, EF231-277, EF289-316.	MZ serials ordered to replace N6025-28 and N6031.
Austin Motors	429	BK648-667, BK686-727, BK759-784, BK798-818, EH875-909, EH921-961, EH977-996, EJ104-127, LK375-411, LK425-466, LK479-521, LK535-576, LK589-624.	
STIRLING MARK IV Short & Harland Belfast	450	EF317-323, LJ810-851, LJ864-899, LJ913-956, LJ969-999, LK114-156, LK169-211, LK226-257, LK270-313, LK436-370, PK225-237, PW384-425, PW438-465.	
STIRLING MARK V Short & Harland, Belfast	160	PJ878-923, PJ935-959, PJ971-999, PK115-158, PK171-186.	

TOTAL AIRCRAFT BUILT AND FLOWN: 2,371.

STIRLING PRODUCTION

NOTES

Total number of aircraft built was 2,382 (this figure includes the eleven aircraft destroyed on the ground in air raids). Aircraft listed as Rochester-built include those built at South Marston shadow factory. Aircraft listed as Belfast-built include those built at Queen's Island, Aldergrove, Long Kesh and Meghaberry. A number of aircraft listed as Mark I aircraft appeared later as Mark III's after conversion at Maintenance Units and many Mark III's were similarly converted to IV's.

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