WARPAINT SERIES No. 34

Avro LINCOLN

including engine test bed aircraft

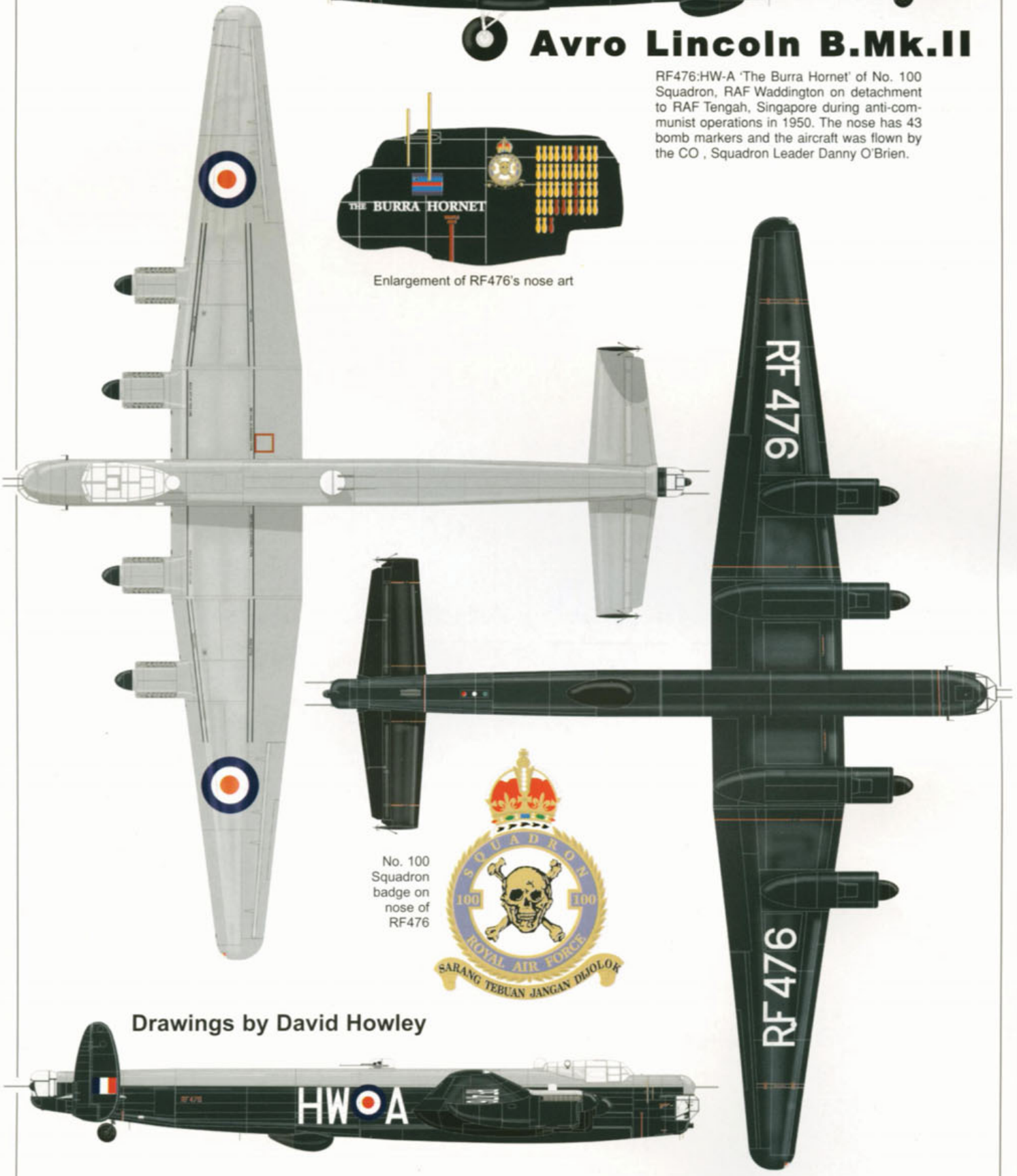
BY TONY BUTTLER AMRAeS

One of a well-known series of pictures of Avro Lincoln B.Mk.2 RF570 taken when serving with the Bomber Command Bombing School, RAF Lindholme, in about 1960. (BAC)

Avro Lincoln B.Mk.II

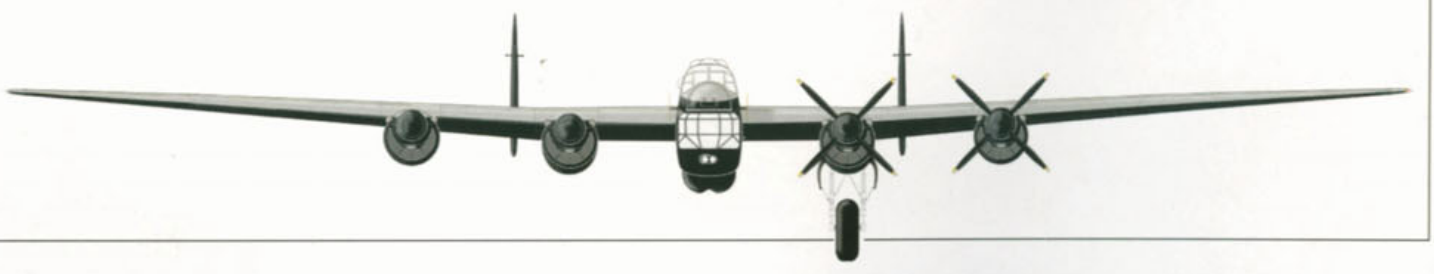
RF476:HW-A 'The Burra Hornet' of No. 100 Squadron, RAF Waddington on detachment to RAF Tengah, Singapore during anti-communist operations in 1950. The nose has 43 bomb markers and the aircraft was flown by the CO , Squadron Leader Danny O'Brien.

Enlargement of RF476's nose art



No. 100 Squadron badge on nose of RF476

Drawings by David Howley



AVRO LINCOLN

Lincoln RF398 on display at RAF Abingdon in June 1968 during the Queen's silver jubilee review of the Royal Air Force. This aircraft is the one that is now preserved at the RAF Museum, Cosford. (Peter Green)

by Tony Buttler AMRAeS

During World War 2 the Avro Lancaster established for itself an outstanding reputation as a heavy bomber. As one might expect its successor received, by comparison, relatively little publicity but it nevertheless performed well for many years in the RAF, RAAF and Fuerza Aerea Argentina. The aircraft in question was the Avro Type 694 Lincoln which was designed by Roy Chadwick, Avro's Chief Designer, who had also been responsible for its predecessors, the Manchester and Lancaster.

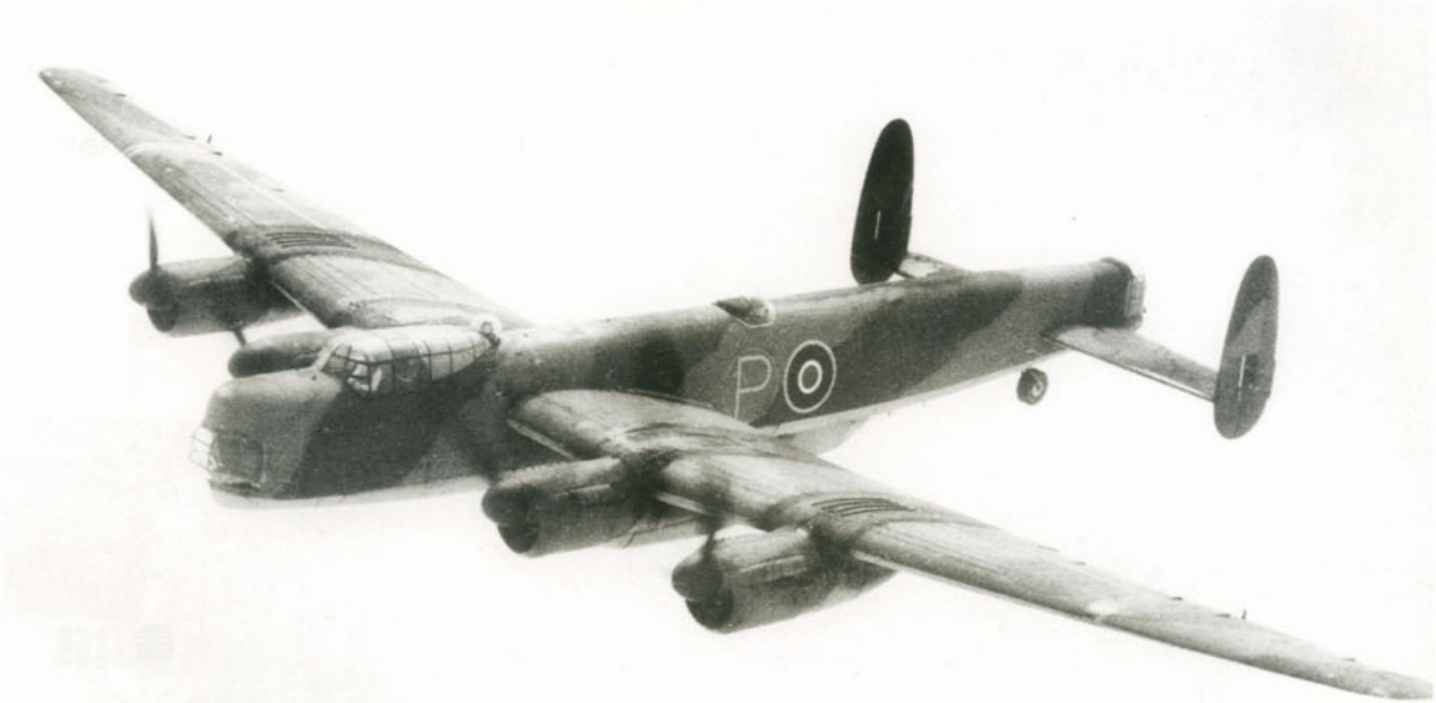
A BIGGER LANCASTER

The need for an improved Lancaster was acknowledged in 1942 and initial estimates for a Mk.IV using four Rolls-Royce Merlin RM.14.SM engines indicated a 70,000lb (31,752kg) all-up-weight, a top speed of 346mph (557km/h) at 20,000ft (6,096m) and 225mph (362km/h) at 30,000ft (9,144m), and service ceiling 34,000ft (10,363m). Its introduction, along with the Vickers Windsor bomber, was thoroughly considered by the Air Staff's Defence Committee who decided at the end of the year that these two types 'were the best that could be brought into service in time to effect the future course of the war'. They would supplement and eventually replace Bomber Command's Lancasters.

A prototype contract was placed in July 1943 and the first production order for 162 aeroplanes followed a month later. Production Specifications for two versions were issued under B.14/43 to cover 'The Design and Construction of Lancaster B.Mk.IV and Mk.V Bombers by the Parent Firm'. The original requirements were essentially the same as the Lancaster Mk.III but with increased armament and protection and Merlin 85 or 68 engines for the respective marks. However, one objective was to make the new type suitable for operations in the Pacific theatre as a contribution towards helping America defeat Japan but this needed much greater range and ceiling.

The new marks resembled the Lancaster but there were many differences and it was realised that a new name would be more suitable; an old name meant an old aircraft. Avro wanted a new one but Bomber Command preferred to retain Lancaster. In June 1944 Avro suggested Lincoln which J.D.Breakey, Assistant Chief of the Air Staff (Technical Requirements), noted was 'very appropriate as it falls within the bomber cat-

The Lincoln prototype PW925 in its original form in the summer of 1944 with three-bladed propellers, small rudders, no guns and green and brown camouflage with yellow undersides. (Peter Green)



This airborne view of the first Lincoln prototype PW925 was taken during it's maiden flight on 9 June 1944. (Peter Green)

egory (i.e. a city) and is moreover the name of a city within the area in which Bomber Command operates their aircraft'. The firm also offered Sandringham and Stafford but Lincoln was the most favoured and was officially adopted in August. The Avro 694 Lancaster IV and V became the Lincoln B.Mk.I and B.Mk.II respectively.

During July and August 1943 a modified nose was fitted to Lancaster ED371 because Bomber Command had been critical of the Lancaster bomb-aimer's prone position. This alternative arrangement provided a seat, flat glass panelling and a new turret with twin 0.5in (12.7mm) guns. Flight testing began in September 1943 and proved a success; visibility was much improved while the aircraft's top speed rose by six mph (10km/h), so a similar nose was adopted for the Lincoln. Lincoln was rather bigger than Lancaster both in span and length and there were changes to the bomb bay and defensive armament. It was intended that the larger wing would considerably extend high altitude and cruise performance but it also meant that many hangars could not cope with the extra span, so side-tracking skates fitted around the undercarriage had to be used to 'slide' the machines into their hangars.

The urgency to get the Lincoln into service was diluted by events. Throughout the war changing a production line from an old to a new type always brought complex problems and in 1944 the well established Lancaster seemed quite adequate for 1945, but it left no spare manufacturing capacity. As the situation in both Europe and the Pacific improved, the need for the new bomber receded and the priority for its production dropped. The book *Lincoln at War* reports plans to cut Lancaster production from 284 a month in November 1944 to 124 a month in June 1945, followed by phasing out in November. Lincoln production would then rise from 66 a month in March 1945 to 123 in May and 200 a month from August. These targets were never reached and when the atomic bomb was dropped on Japan in August 1945 the war was over.

The need for so many bombers was gone and the planned British Pacific Tiger Force, designed to supplement the USAAF and establish a British presence in the lead up to the invasion of Japan, was disbanded on 31 October. The Lincoln was due to join Tiger Force with No. 57 Squadron but the unit had not deployed to the Far East when VJ-Day arrived. Daylight operations were planned with Hornet and Mustang escort fighters and

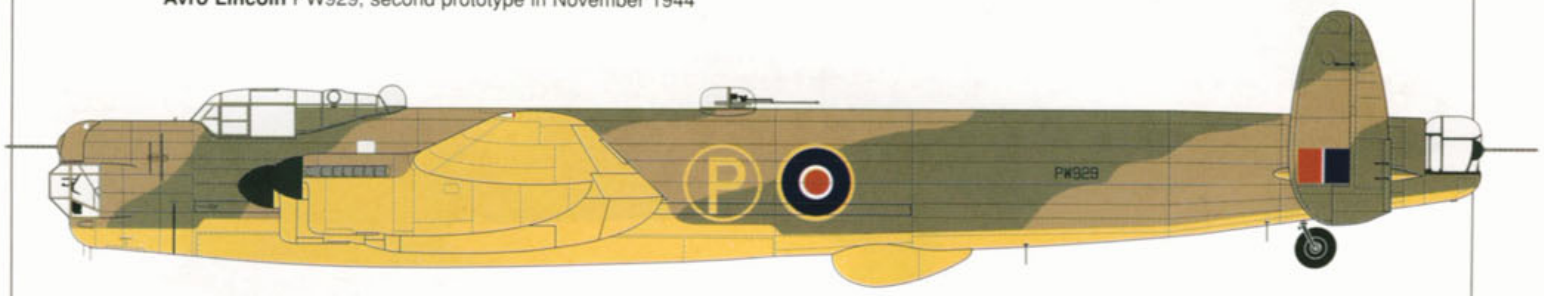
Above: RE228 the second production prototype flying with A&AEE between 27 March and 10 July 1945. The one inch (2.5cm) wide jacking positions are visible but it lacks the white underwing serials introduced to all military aircraft just after the war. Below: Official photograph taken in January 1945 of Avro-built B.Mk.I RE228, the second production aircraft with the larger rudders, three-blade props and no guns. The next month this aircraft went to Rolls-Royce at Hucknall and then in March to A&AEE for intensive flying trials (Crown Copyright/MoD)

Avro Lincoln camouflage and markings

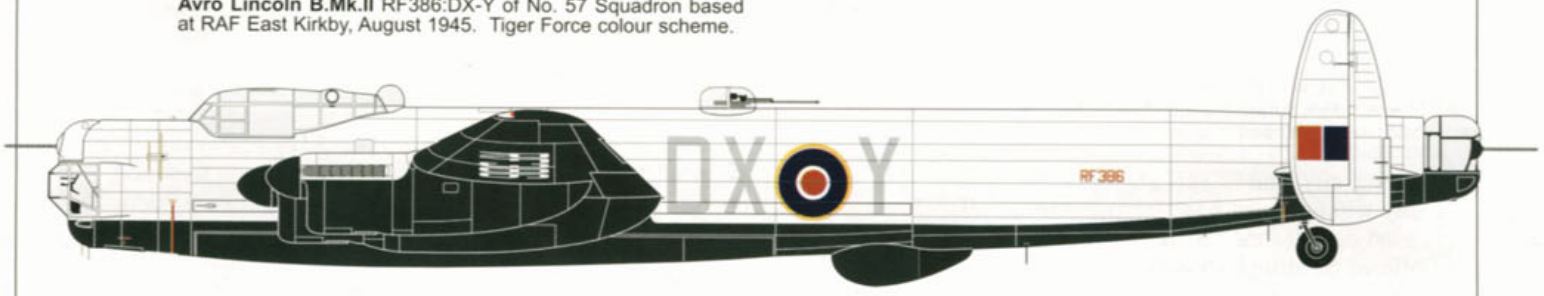
Drawings by David Howley

AVRO LINCOLN COLOUR KEY

Avro Lincoln PW929, second prototype in November 1944



Avro Lincoln B.Mk.II RF386:DX-Y of No. 57 Squadron based at RAF East Kirkby, August 1945. Tiger Force colour scheme.



Avro Lincoln B.Mk.II RF388:KM-C of No. 44 Squadron based at RAF Mildenhall. Flown by Flt Lt John Chatterton in February 1946. Tiger Force colour scheme but with black codes.

Avro Lincoln B.Mk.II RF498:DF-P of Central Bombing Establishment seen during an extended tour of Southern Rhodesia and South Africa in March 1948. Unusual natural metal colour scheme

Avro Lincoln B.Mk.II RF513:KC-A of No. 617 Squadron, RAF Binbrook late 1947. Wing Commander's pennant on nose.

Avro Lincoln B.Mk.II RF514:LS-B of No. 15 Squadron, RAF Wyton late 1940s. This aircraft had the bulged bomb bay for either 12,000lb Tallboy or 22,000lb Grand Slam bomb trials.

No. 44 Squadron badge

Avro Lincoln B.Mk.II RF423:KM-K of No. 44 Squadron based at RAF Wyton in early 1948.

Avro Lincoln B.Mk.II SX975:DF-C of the Central Bomber Establishment, RAF Marham in the early 1950s. The spinners of this aircraft were probably yellow.

up to 600 Lincolns were expected to be used, half fitted with in-flight refuelling equipment, together with some Lancasters. The Lincoln B.Mk.I was to enter service in May 1945, the B.Mk.II in July with deployment to the Far East from 15 August. Huge numbers of Lincolns were now cancelled.

CONSTRUCTION

B.14/43 called for a Boulton Paul F Type front turret with two 0.50in (12.7mm) Browning machine guns, a Martin 250 CE.23 or Bristol B.17 mid-upper turret, one 0.50in Browning for rear under defence and a Frazer-Nash FN.82 hydraulic tail turret. In the event all production aeroplanes eventually had the F Type nose turret, remotely controlled from the bomb-aimer's seat with a periscopic sight, and the B.17 dorsal with twin 20mm Hispano cannon, but the rear turret was a Boulton Paul D Type with twin 0.50in Brownings radar controlled by a blind-firing device in the extreme tail of the aircraft known as AGL (automatic gun laying); there were no lower guns. First prototype PW925 did receive a Martin dorsal turret with twin 0.50s and early production examples initially received the same plus a Frazer-Nash FN.121 tail turret with four 0.303in (7.7mm) machine guns; the correct types were retrofitted when they became available (both second and third prototypes had Bristol 17 dorsal turrets).

Lincoln's all-metal semi-monocoque fuselage was built in five main sections - nose with front turret, cabin, centre section, aft

Above: Official view of a B.Mk.II in March 1945, almost certainly AWA-built RF329 although the censor has worked hard to blot out the serial. This was the first production aircraft; fitted with guns and three-blade propellers. Below: RA638 was a MetroVick-built Mk.I first flown on 3 September 1945 and is shown without spinners. Unlike most Mk.Is, this aircraft left its MU in August 1948 and went to Woomera in Australia. It was scrapped in 1952.

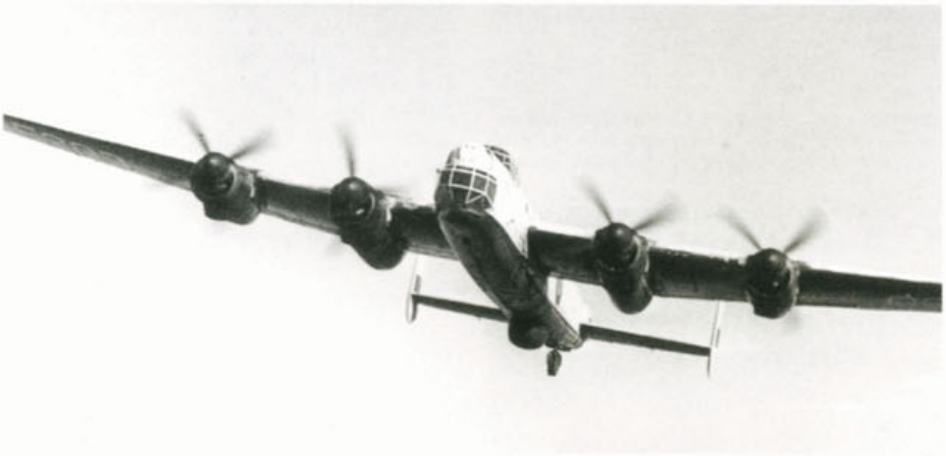
Above and below: Two contrasting pictures of second production prototype B.Mk.1 RE 228. This aircraft had an interesting career with Rolls Royce and at Boscombe Down. Interestingly both pictures show it without armament apart from the mid-upper turret. Three bladed propellers were still in evidence before the engines were changed.

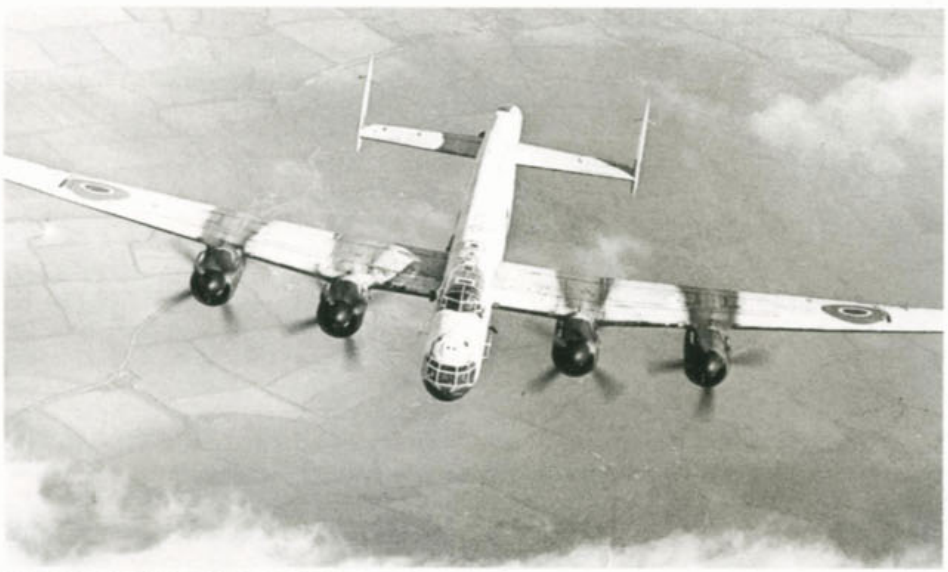
section bearing the dorsal turret and the tail section with the tail unit and rear turret. The wing was also built in five sections - a centre section integral with the fuselage and bearing the inner engine nacelles and undercarriage attachments, two intermediate sections with the outer nacelles and two outer wings. A two-spar structure and heavy ribbing was used with stressed light alloy skin employed throughout. The outer wings were made in two portions, unlike the Lancaster who's outer wing came as a single portion with a detachable tip. As a result the ailerons were also constructed in two sections with a link plate between them to allow for wing flexing (of some account in such a large span wing). The ailerons were all-metal with metal covering and had auto servo-tab and hand trim tabs while the hydraulically operated trailing edge split flaps came in two sections between the ailerons and fuselage.

A standard Lancaster all-metal cantilever tail unit was used which, after flight test, received a slight change in shape and increased rudder area from a larger and longer trim tab. The old tail unit was retained because a 6ft 7in (2.0m) fuselage extension helped to balance the aircraft but it meant the dorsal turret, placed above the rear of the bomb bay, much impeded the crew's movements inside. The two-spar tailplane had twin elliptical fins and rudders with sheet metal covering on all surfaces; inset trim tabs were used for all movable surfaces with automatic balance tabs in the elevators.

A stronger undercarriage developed from the Lancaster's had each main wheel carried between two Dowty legs which retracted backwards into the inner engine nacelles; the tail wheel could not retract. There were six fuel tanks, a light alloy tank between each inboard nacelle and the fuselage and two flexible tanks in each intermediate wing panel; total capacity was 3,580gals (16,278lit). The crew comprised front gun-

Above, below and bottom: Three views of Lincoln Mk.II RE290 in Rolls-Royce hands during the summers of 1945 or 1946. Fitted with Merlin 68s (note the dark cowlings) this aircraft became non-standard and as a 'Mk.I' passed to civilian hands in 1949 for use as a freighter during the Berlin Airlift. Note the ever-present exhaust stains on the wing upper surfaces. (Bill Harrison and Rolls-Royce)



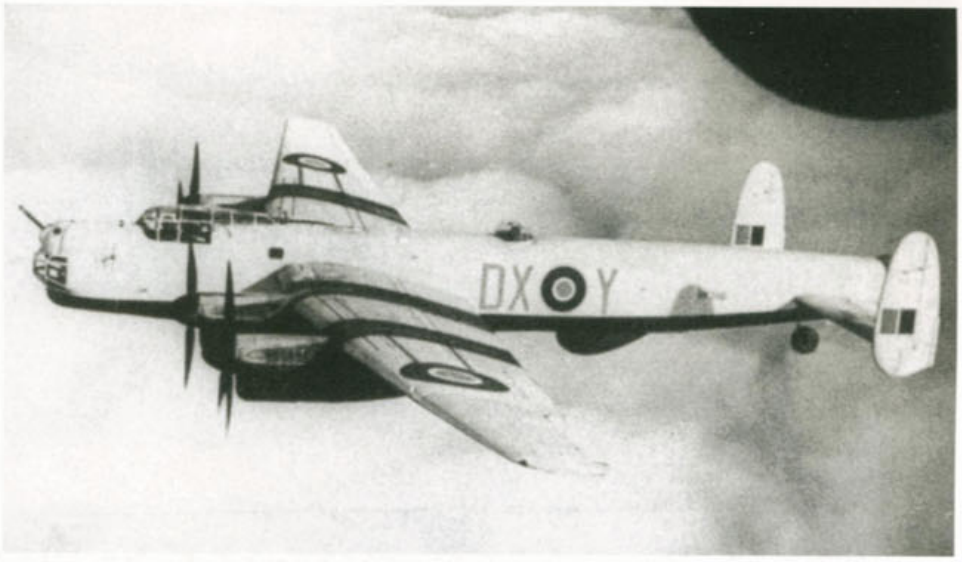


ner/bomb-aimer, pilot, flight engineer/co-pilot, navigator, wireless-operator, dorsal gunner and rear gunner. An H2S radar was fitted in the ventral fuselage covered by a cupola and an F-24 camera was also carried. Navigation equipment included Rebecca Mk.II, Loran and Gee Mk.II.

After some years research into power plants by Rolls-Royce, Hucknall, a new installation was introduced offering low drag plus armour plating to protect against enemy fire. This new type of power-egg was broadly based on an annular cowling and radiator system and experimental installations were made and tested on a Lancaster at Hucknall. Combined with the Lincoln's new 'high-lift' wing, they were expected to carry very large bombs. Lincoln's Merlin power-eggs were enclosed in cylindrical cowlings and gave a quite different appearance to the standard Lancaster unit. Either Rotol or de Havilland four-blade constant-speed full-feathering airscrews were fitted, 13ft 0in (3.96m) in diameter (prototype PW925 had Hamilton Hydromatic constant-speed fully feathering propellers).

FLIGHT TEST

The Lincoln prototype PW925 first flew from Ringway, near Manchester, on 9 June 1944 piloted by Capt. H.A.Brown. It lacked armament and had Merlin 85s and three-blade propellers. Between 15 and 23 July it was at Boscombe Down for preliminary examination and brief performance trials. General handling characteristics up to 75,000lb (34,020kg) weight were considered satisfactory and the flying controls were pleasant and adequately effective under all conditions of flight, but the rudder



Tiger Force Lincoln Mk.II of No. 57 Squadron RF386 DX:Y in 1945. (Peter Green)

was on the heavy side compared to the ailerons. Take-off with 20 per cent flap was normal and straightforward though the tail took longer to rise than a Lancaster, but take-off run did not appear unduly long. The stall at 58,000lb (26,309kg) with flap and undercarriage up came at 95mph (153km/h) indicated airspeed, with everything down 73mph (117km/h); in both cases tail buffeting began at about six mph (9.5km/h) above the stall.

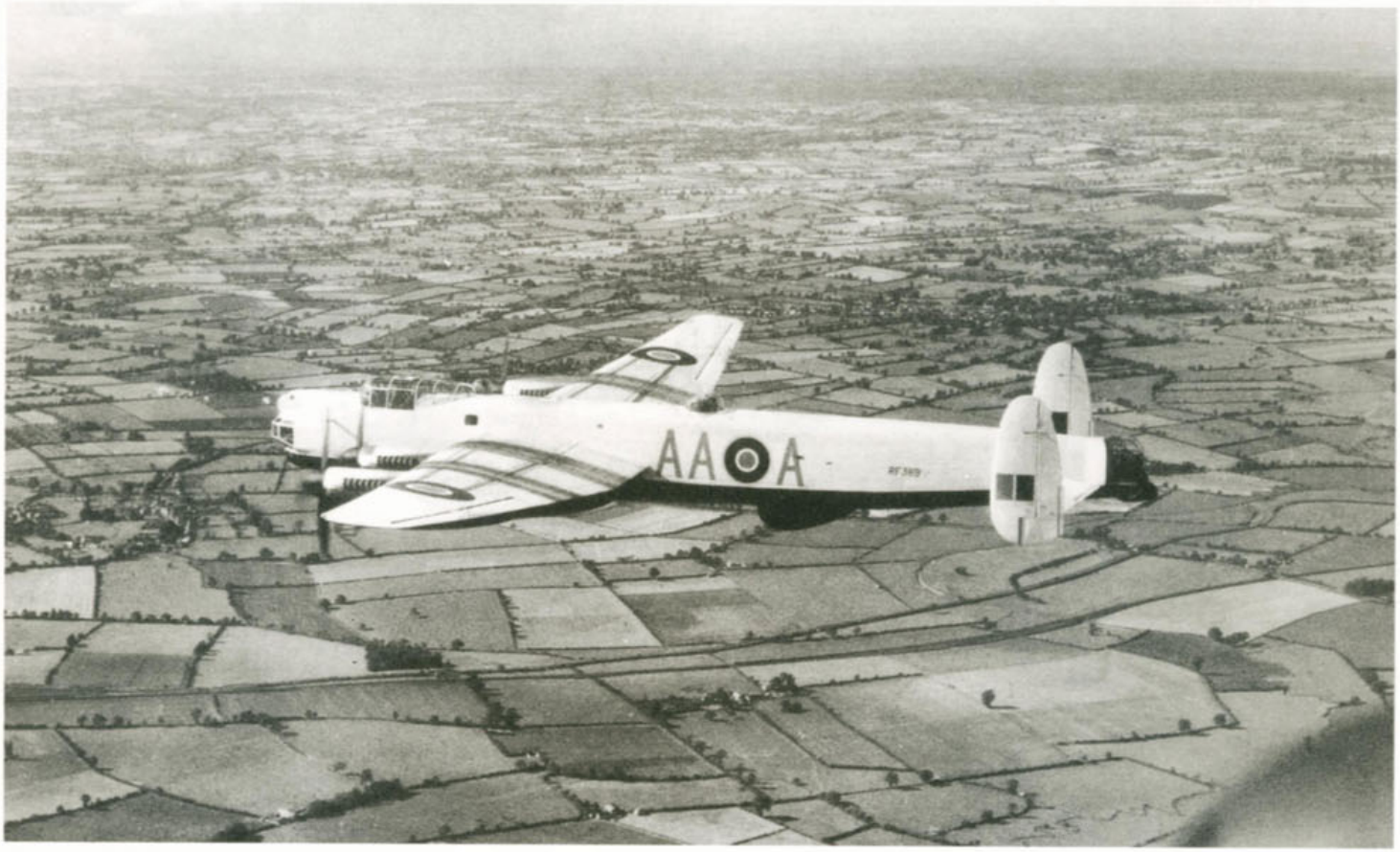
Maximum speed obtained in a dive was 370mph (595km/h), PW925 becoming progressively tail heavy as speed increased; the stick force required to maintain the dive was small up to 320mph (515km/h) but noticeably higher beyond that figure. On landing the wheel brakes were much better than the Lancaster's and PW925 could be pulled up in a very short distance. Performance and handling on three engines was satisfactory but when flying with the outer engine propeller on one side feathered and the inner engine windmilling in coarse pitch, the necessary footloads, even using rudder trim, would soon prove very tiring. An increase in rudder tab area was considered beneficial (which Avro was already working on). Still unarmed, PW925 flew with the larger rudders on 6 September 1944 and new A&AEE tests showed the type's asymmetric characteristics were much improved.

PW925's level speeds at 71,000lb (32,206kg) weight were 295mph (475km/h) at 15,000ft (4,572m), 300mph (483km/h) between 16,400ft (4,999m) - the full throttle height with 18lb boost - and 18,000ft (5,486m), and 274mph (441km/h) at 27,000ft (8,230m). Times to height were 7.2 minutes to 6,000ft (1,829m), 15.2 to 12,000ft (3,658m), 34.5 to 22,000ft (6,706m) and 57.5 to 26,000ft (7,925m). Rate-of-climb at 6,000ft was 830ft/min (253m/min), at 22,000ft this fell to 440ft/min (134m/min). Service ceiling was 27,800ft (8,473m) and maximum cruise speed 276mph (444km/h) at 23,000ft (7,010m). The second prototype PW929 flew on 9 November 1944, the third, PW932, on 9 December 1944.

Trials showed that a 75,000lb (34,020kg) all-up-weight Lincoln's bomb load/range was poorer than a 68,000lb (30,845kg) Lancaster's but the former's top speed and maximum weak mixture cruising speed were much better and this was important for reducing operational casualty rates. The same applied for a Lincoln at 82,000lb (37,195kg) against a Lancaster at 72,000lb (32,660kg). Climbing at 170mph (273km/h) Lincoln RE254 showed the same flight characteristics as the Lancaster but with a better performance taking just 26.5 minutes to reach 20,000ft (6,096m) compared to the Lancaster's 41.5 minutes. Lincoln was about 10mph (16km/h) faster but its ceiling was 2,000ft (610m) less and in cruise the controls were heavier than the Lancaster's, particularly the ailerons.

In April 1945 A&AEE tested B.Mk.1 RE232 at 82,000lb which proved little different from 75,000lb except the aircraft was not so responsive to the controls. RE232 only differed from PW925 in having the bigger rudders and the nose turret installed. Elevator control was light and responsive, the rudder and ailerons slightly heavier, and at about 80,000lb (36,288kg) the stall with flap and undercarriage up came at 112mph (180km/h), with everything down 87mph (140km/h). From May RE227 tested the effects of turret rotation on handling and found a yawing and rolling motion to the side when the mid-upper and rear turrets were traversed; the foot loads required to hold the aircraft were not excessive but

No. 75 Squadron's RF389 AA:A seen in Tiger Force white in September 1945, one of three machines just delivered to that unit at RAF Spilsby. (Alan Hall collection)



Avro Lincoln B.Mk.II SX930:B-BTU of the Bombing Trials Unit, RAF West Freugh in the early 1950s.

Avro Lincoln B.Mk.II RE296:QN-BW of No. 214 Squadron based at RAF Upwood in May 1950.

Avro Lincoln B.Mk.II SX983:KO-X of No. 115 Squadron, based at RAF Mildenhall in 1950

No.115 Squadron badge

Avro Lincoln B.Mk.II RF562:SN-N of No. 230 Operational Conversion Unit, RAF Scampton, in July 1950.

No. 230 OCU unit badge

Avro Lincoln B.Mk.II SX991:OT-C of No. 58 Squadron based at RAF Wyton in the autumn of 1951.

Avro Lincoln B.Mk.II RE367:FGAW named *Aries III* of the RAF Flying College, RAF Manby in 1951.

Left: New-built Lincoln Mk.II RF575 waiting delivery from Armstrong Whitworth Aircraft in 1947. Note the four-blade propellers, nose guns and the transparent H2S radome. (Eric Morgan) Lower left: Three No. 617 Squadron aircraft seen during their August 1947 visit to the USA. (Peter Green)

would be tiring over a long period.

The main problems were vibration (possibly compounded by the long wing which flexed much more than a Lancaster's), flaps and undercarriages dropping when 'up' and failures in the engine crank case, wheel case and supercharger casing. These would have delayed the type joining Tiger Force. One proposed solution was to replace the three-blade propellers with four-blades since it was thought that the engine vibration pattern corresponded with the airframe's. RE229 was thus modified in July 1945 by TFU Defford, the vibration disappeared and there were no further engine failures from it. In addition a suitable combination of engine plugs and resistors was found which improved serviceability.

Earlier, between 27 March and 10 July, A&AEE had carried out 172 hours intensive flying with RE228 to try and resolve these problems. The first 23 hours were flown with Nash Kelvinator three-blade propellers and four powerplants and one engine were removed for failures of crankcase or supercharger joints. Four-bladers were then fitted and no further joint failures occurred. Despite these teething troubles, the test pilots generally liked the new bomber.

INTO PRODUCTION

Much use was made of existing Lancaster jigging to build the Lincoln. As a measure of the expected heavy 'wartime' Lincoln production, lines were established at Avro's, Chadderton and Metropolitan-Vickers, Trafford Park facilities, with final assembly and flight from both lines at Woodford, plus

Left: Lincoln B.Mk.II RE380 DX:F of No. 57 Squadron in 1946. (Flight) Below: Specially coded 'AS' Mk.II Lincolns RF463:A, RF467:B and RF468:C on 25 October 1946 before departing for 'Operation Lincoln Goodwill'. During the trip the 'AS' codes were substituted by 'GB'. (Crown Copyright/MoD)

Brand new Lincolns waiting delivery to a Squadron. RF355 served with four different squadrons before being sold for scrap in 1956. Note the small H2S Mk.IIIG radome. (Bill Harrison)

Above: Lincoln RE368 as SN:Q of No. 230 Operational Conversion Unit photographed at Middleton St. George in 1949. (MAP) Below: RA719 with the larger H2S Mk.IVA radome. Note the fuselage serial in large letters which were coming into use at the time. (Bill Harrison)

Armstrong Whitworth's (AWA) factory at Baginton. AWA's aircraft were all final assembled and flown from Baginton; Bitteswell may have been involved with sub-assembly but not Lincoln production flight testing.

Big orders were also booked in at Avro's 'shadow' factory at Yeadon and at Victory Aircraft, Malton, Ontario, but post-war cutbacks meant the former completed only six before the facility closed. Just the one was built in Canada. Serial FM300, designated a Mk.XV as a Canadian version of the Mk.I, was rolled out on 20 October 1945 and made its maiden flight on the 25th flown by Victory test pilot Ernie Taylor. It was taken on strength on 17 August 1946 but completed a mere handful of flights before being struck off charge on 4 March 1947 and passing to a scrapyard shortly afterwards, apparently with five part-completed aircraft which formed the balance of an initial batch.

The first production Lincoln B.Mk.Is were despatched by Avro late in February 1945. Numerous examples went to A&AEE, Rolls-Royce, Hucknall for engine installation trials (RE228 and RE230), the Telecommunications Research Establishment's Flying Unit (TFU) at Defford for radar installation (RE229) and RAE for other trials and development units. However, because Mk.Is had unmodified Merlin 85s, most were delivered direct to

Avro Lincoln production list

UK Production

Prototypes (3 built): PW925, PW929 & PW932 (built by Avro Manchester)

Mk.1 (82): RA628 to RA655 (built by Metropolitan-Vickers), RE227 to RE268, RE281 to RE288 (all Avro, Chadderton), RF333 to RF334 (Armstrong Whitworth, Baginton), SS713 to SS714 (Avro, Yeadon)

Mk.2 (447): RA656 to RA658, RA661 to RA693, RA709 to RA724 (all MetroVick), RE289 to RE325, RE338 to RE380, RE393 to RE424 (all Chadderton), RF329 to RF332, RF335 to RF370, RF383 to RF427, RF440 to RF485, RF498 to RF539, RF553 to RF577 (all AWA, Baginton), SS715 to SS718 (Yeadon), SX923 to SX958, SX970 to SX993, WD122 to WD133, WD141 to WD149 (all AWA, Baginton)

Cancelled (3,700): Serials RA725 to RA749, RA763 to RA786, RE425 to RE435, RE449 to RE493, RE518 to RE561, RE575 to RE605, RE621 to RE670, RE683 to RE726, RE740 to RE785, RE798 to RE839, RE853 to RE895, RE918 to RE955, RE967 to RE999, RF111 to RF119, RS102 to RS147, RS159 to RS189, RS203 to RS225, SR707 to SR749, SR766 to SR790, SR814 to SR851, SR864 to SR907, SS341 to SS386, SS399 to SS435, SS449 to SS480, SS493 to SS535, SS549 to SS589, SS603 to SS650, SS664 to SS698, SS719 to SS758, SS773 to SS815, SS828 to SS869, SS882 to SS925, SS937 to SS968, SS980 to SS999, ST113 to ST157, ST171 to ST215, ST228 to ST269, ST283 to ST327, ST339 to ST369, ST381 to ST425, ST438 to ST475, ST477 to ST513, ST528 to ST569, ST583 to ST627, ST641 to ST680, ST693 to ST735, ST748 to ST790, SX994 to SX999, SZ113 to SZ158, SZ172 to SZ215, SZ228 to SZ259, SZ275 to SZ306, SZ319 to SZ363, SZ380 to SZ415, SZ429 to SZ471, SZ488 to SZ493, SZ506 to SZ556, TG758 to TG799, TG813 to TG856, TG870 to TG908, TG921 to TG945, WD150 to WD154; and within ranges RT140 to RT456, RT700 to RT750, SA450 to SA549, TG946 to TH182, TJ922 to TK288, TP823 to TR733, TZ245 to TZ436, VG925 to VG952, VK907 to VL136 with gaps

Exports and Overseas Production

For wartime RAF/RCAF (from Victory Aircraft, Malton, Canada)
B.Mk.XV (1): FM300 (FM301 to FM305 part complete when cancelled; others, possibly in series FM306 to FM399 or SA450 to SA549, never begun)

For RAAF (all built by Government Aircraft Factory, Melbourne)
B.Mk.30 (25): A73-1 to A73-25 (4 Merlin 85B, later 2 85B + 2 Merlin 66; A73-1 to A73-10 initial all-up-wt 70,000lb [31,752kg], rest had structural modifications to permit 75,000lb [34,020kg])
B.Mk.30A (25): A73-26 to A73-50 (4 Merlin 85B, later 2 85B + 2 Merlin 66, later 4 Merlin 102; further structural modifications to permit 82,000lb [37,195kg]; A73-28 and -48 converted to GR.Mk.31, A73-28 converted to MR.Mk.31)
B.Mk.30A (11): A73-51 to A73-61 (4 Merlin 102; A73-55 to A73-57 and A73-59 to A73-61 converted to GR.Mk.31, A73-55, -57, -60 and -61 converted to MR.Mk.31)
GR.Mk.31 (5): A73-62 to A73-66 (4 Merlin 102; A73-62, -65 and -66 converted to MR.Mk.31)
GR.Mk.31 (7): A73-67 to A73-73 (4 Merlin 85B, later some 4 Merlin 102; A73-67 and -68 converted to MR.Mk.31; A73-71 to A-73-73 stored without engines, never issued)
(Note: Mark number is based on all-up-weight, not engine fitting)

For Fuerza Aerea Argentina
B.Mk.2 (12 ex-RAF): B-001 to B-012 (Ex-RE343, RE349 to RE356, RE408 to RE410 respectively)
B.Mk.2 (18): B-013 to B-030 (new-build by AWA, Baginton)

Instructional Airframes

Prototype: PW925 as 6141M (Halton) 1946
Examples Mk.1: RA646 as 6632M (Kirkham) 1949, RE228 as 6279M (Hemswell) 1947, RE284 as 6987M (North Coates) 1952
Examples Mk.2: RE321 as 7111M (Yatesbury) 1953, RE342 as 6915M (Yatesbury) 1951, WD127 as 7164M 1954
RAAF: A73-22 as No. 3 (RAAF School of Technical Training, Wagga) until 11.63

long term storage outdoors at various Maintenance Units (MUs), particularly No. 10 at Hullavington and No. 45 at Kinloss. There were plans to give them modified Merlin 85s for training duties but this was never implemented and in February 1949 the B.Mk.I was classified 'obsolete'. The mark never entered service and over 40 were sold for scrap in November and December; many examples had only flown their delivery flights but, after store, they were showing signs of corrosion.

The RAF's first machine, RE240, went to the Bombing Development Unit, Feltwell, in May 1945 but, despite nearly 50 Lincolns having been test flown by the end of the Pacific War, not one had entered squadron service. Apart from the powerplant problems, none were finished to the required standard though by year's end the airframe stockpile had begun to receive the correct equipment. It was arranged that all Lincolns should pass through a modification centre before release. AWA now began delivering B.Mk.IIs with Packard Merlin 68s, the correct turrets and H2S. Rolls-Royce, Hucknall had converted RE230 into a Mk.II with Merlin 68s in March 1945 but the official Mk.II prototype was RE289 which first flew on 2 July 1945. During 1946-47 Lincoln production outstripped the needs of the squadrons and many aircraft went into long term open store which again raised the problem of corrosion, so AWA was contracted to undertake remedial work on these aircraft. The last all-new RAF Lincoln was delivered in April 1951.

INTO SERVICE

The B.Mk.II was cleared for operational trials in August 1945. Three went to the Lincoln Trials Flight, No. 57 Squadron, East Kirkby, in late August (RF385 first) and three more had joined No. 75 (New Zealand)

Lincoln RF355 showing much of the under surface detail. By this time post-war underwing serials in white had re-appeared on most RAF aircraft in Bomber Command. This example is fully armed and more than likely on a delivery flight to an operational squadron (Bill Harrison)

Avro Lincoln B.Mk.II RE386:FJS-A of the Central Gunnery School, RAF Leconfield in 1951. Spinners may have possibly been in blue.

Avro Lincoln B.Mk.II RE424:SR-F of No. 101 Squadron, RAF Binbrook in June 1951. Fin stripes are in yellow, spinners probably black and white.

No. 100 Squadron badge

Avro Lincoln B.Mk.II SX944 of No. 100 Squadron based at RAF Hemswell. Seen on Exercise Sunray at RAF Shallufa, Egypt, in 1948

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Lincoln units 1. RF349 taken at Waddington on 20 September 1952. This aircraft crashed in the Middle East on 17 December 1953. (Bill Harrison) 2. QN:AW of No. 214 Squadron is seen landing. This is probably RA709 which served with 214 between March 1950 and February 1955. 3. RE301 first flew from Woodford on 24 July 1945. It is seen without dorsal turret or nose guns and has the 42in high white fuselage serials introduced in late February 1952 to replace squadron identity letters to allow aircraft to be easily exchanged between squadrons at the same base. RE301 was serving with No. 7 Squadron. 4. RF395 serving with No. 15 Squadron. 5. Early Mk.II RA665, probably with No. 97 Squadron. 6. RA722 with Bomber Command Bombing School.

5

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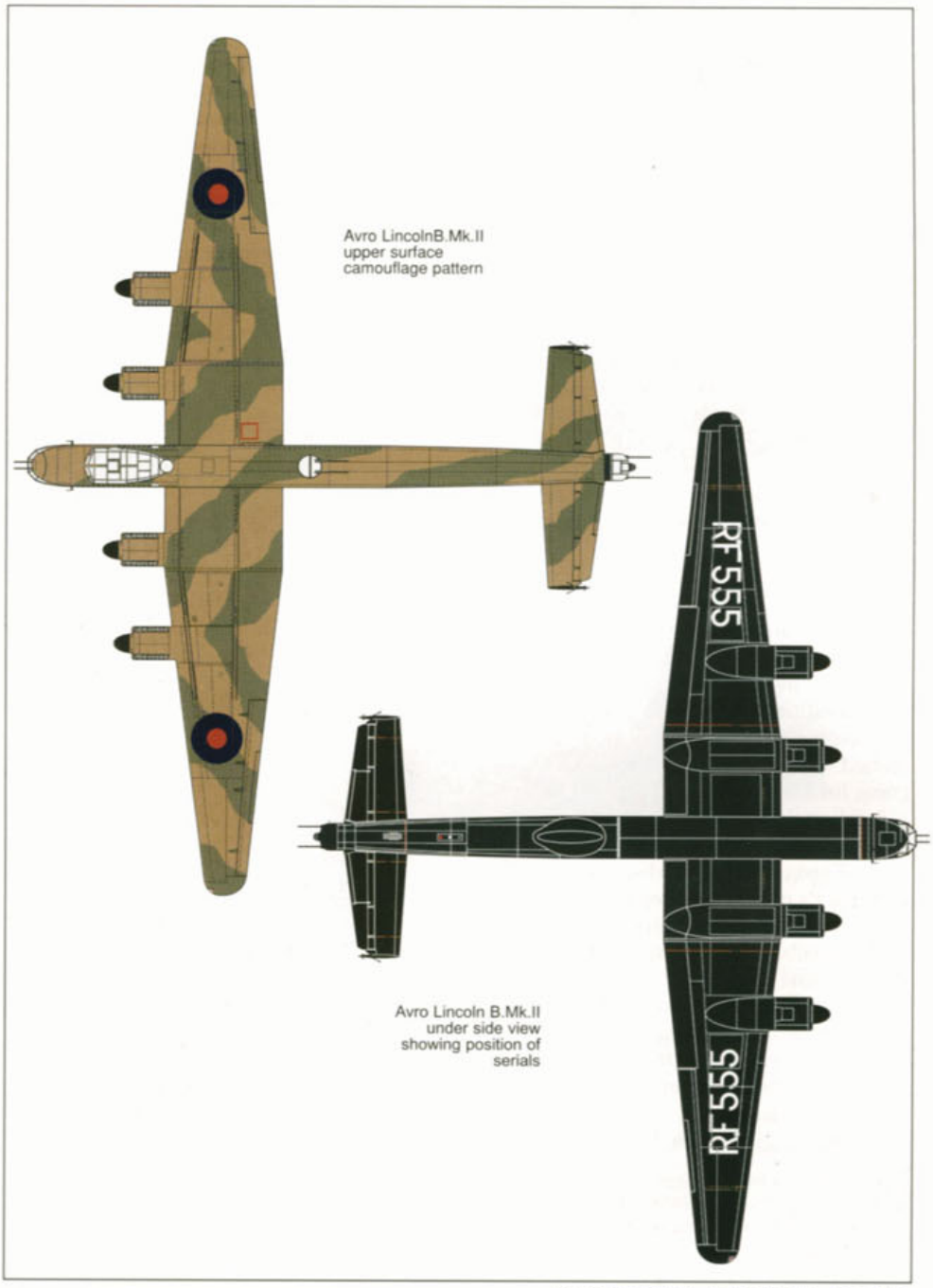
Lincoln RF507 HW:G flying over a small jungle village while serving with No. 100 Squadron, its last unit before being sold for scrap in August 1957. The squadron badge is visible under the cockpit. (MAP)

Squadron by early September, though the latter unit disbanded the next month to be replaced by No. 44 (Rhodesia) Squadron as No. 3 Group's service introduction trials unit. There was little difficulty converting from a Lancaster and gradually take-off weights rose to 82,000lb (37,195kg), though early aeroplanes only just managed to reach 23,000ft (7,010m) when so loaded. In the second half of 1945 winterisation trials were carried out in Canada and tropical trials at Khartoum.

The first job for RAF Lincolns (No. 44 Squadron) was to dump surplus wartime incendiary bombs in Cardigan Bay during March 1946 (Operation Sinkum); on 2 April Bomber Command accepted the type for full squadron service. Re-equipping No. 1 Group now accelerated and Nos. 101 and 97 Squadrons were the first front-line units to get the type; all 1 Group Squadrons had converted by year's end having flown a mix of Lincolns and Lancasters during the transition period. Lincoln's standard operational post-war routine included high level bombing day or night (in poor weather radar bombing techniques were used, basically with H2S updated from its wartime versions), day and night cross-country flights, mock attacks on British targets, circuit work, regular instrument training and formation flying. In addition, six specially equipped No. 1 Group aircraft (called Avro Type 712) were used during 1947 and 1948 to gather meteorological data on very cold and uncomfortable flights over the North Sea and towards the Arctic Circle.

However, compared to wartime, there was relatively little for RAF bomber crews to do so a series of long range overseas flag waving flights were arranged which also gave good air and ground crew training. In November 1946 some Lincolns flew a



Four more Lincolns in squadron or unit markings: Above: Lincoln SX985 (as 'B' of No. 61 or 101 Squadrons - codes QR and SR respectively). Note white and black spinners. Below: Lincoln RF513 KC:A of No. 617 Squadron in America during the unit's 1947 tour. Above: Lincoln RF562 in the markings of No. 230 OCU. Below: Lincoln RF332 as EA:S of No. 49 Squadron. (MAP)

20,000 mile (32,180km) round trip from Scampton to Santiago, Chile, and back (Operation Lincoln Goodwill) and during July and August 1947 19 aircraft, mainly from No. 617 Squadron, made a five week goodwill tour of the USA in a rare trans-Atlantic crossing for the type. The antiquated appearance of the Lincoln was self-evident to both USAF and RAF crews. There were similar trips to Rhodesia, Singapore and a 12-day tour to Pakistan in October 1949 when live bombing demonstrations, included 4,000lb (1,814kg) 'Cookies', were made over Churna Island, near Karachi.

During 1947 No. 3 Group began to convert, Nos. 15, 44, 90 and 138 Squadrons forming the Wyton Wing. The end for the Lancaster in front line service was in sight though No. 3's changeover was to be rather slow. Command exercises began in 1947 while more World War 2 ordnance was dumped in Cardigan Bay under Operation Wastage. Overseas 'Sunray' trips to Shallufa in Egypt were also introduced which continued until 1953 and were designed to give crews experience in flying long range overseas flights in extreme operating conditions. They also gave the chance for bombing practice away from Britain's limited airspace, a full squadron usually going for a month.

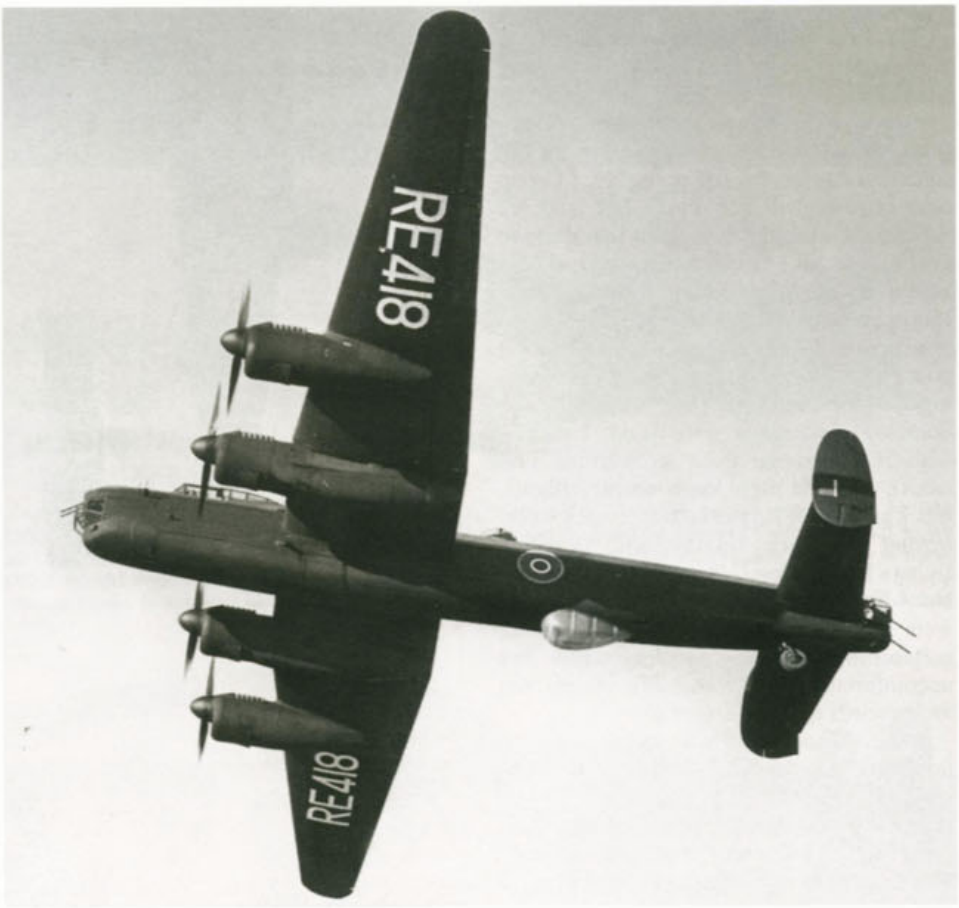
A full-scale three day test of the UK's air defences was mounted in September 1949 under Exercise Bulldog which employed all of Britain's current bomber force (Lincolns, Lancasters and Mosquitoes), plus some USAF bombers; the defenders were mainly Hornets and Meteors. The old wartime bomber stream tactics were used but these were now thought ill-judged and out of date; the Lincoln was found to be a particularly easy target to intercept and two were lost in a mid-air collision.

During 1949 most Lincoln squadrons took part in Operation Popcorn, the bi-monthly training bombing of Heligoland which called for an eight hour sortie, plus the occasional 'Command Bullseye' full-scale attack of the island. Here marking was undertaken by Mosquitoes and No. 83 and 97 Squadron Lincolns with flares and target indicators.

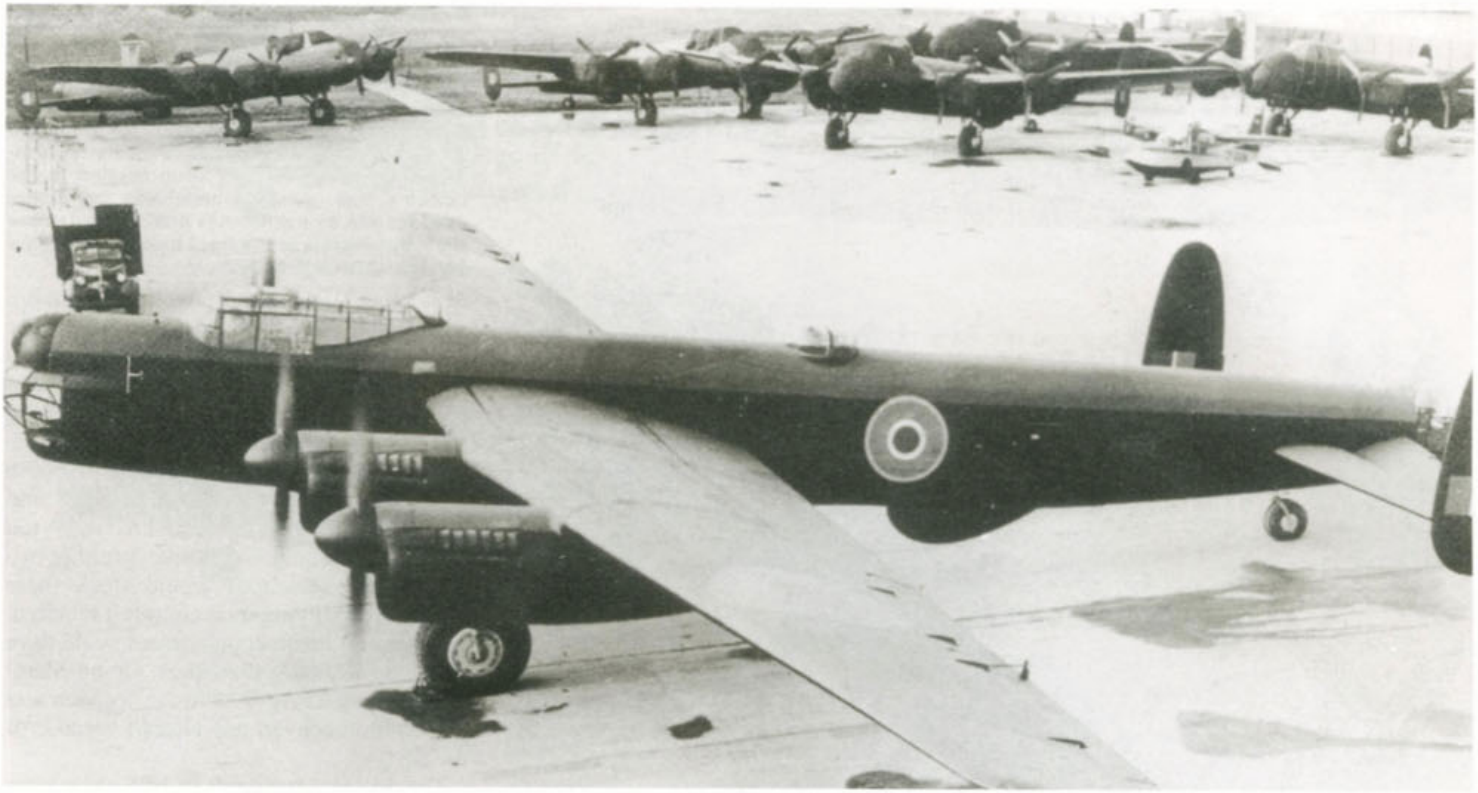
Nos. 83 and 97 Squadrons made up Bomber Command's Flare Force, specialising in radar bombing and navigation using H2S Mk.4A. Well into the 1950s their main role was to mark for other forces, either blind in poor weather with radar or by dropping flares for visual target marking by Mosquitoes of Nos. 109 and 139 Squadrons following behind. H2S was a blind bombing system that calculated electronically the forward throw of the bomb before dropping and presented the information to the navigator radar on his screen.

Exercise Pinnacle, the annual home defence practice held between 29 September and 9 October 1951, included 'raids' on Bristol and Birmingham by 52 Lincolns and 30 B-50 Washingtons, plus six RCM aircraft. However, the weaknesses of piston engined bombers in a jet-powered world now became very obvious because 72 fighter interceptions were made before the incoming bombers crossed the coast.

No. 3 Group completed its Lincoln con-



Lincoln B.Mk.II RE418 taken by Avro photographer Paul Cullerne. RE418 never reached a squadron, instead serving with the manufacturers, Bristol Aircraft and then A&AEE. (Eric Morgan & Alan Hall)



The sole Canadian Lincoln FM300 runs up its engines, possibly before its maiden flight on 25 October 1945. (Peter Green)

version programme in 1950, the last units to receive the type, Nos. 148 and 214 Squadrons, having aircraft on strength early in the year. The process had taken much longer than planned and, almost immediately, the Group's squadrons began to convert to other types. Lincoln could carry nuclear bombs but was unsuited for nuclear delivery because it had insufficient speed and height to escape the detonation. So the RAF acquired American B-29 Washingtons and Nos. 115 and 149 Squadrons began to convert to them in 1950, while No. 101 Squadron became the first Lincoln unit to re-equip with a jet bomber, the Canberra, in June 1951. After 617, 12 and 9 had gone all-jet by May 1952, only Hemswell, Upwood, Waddington and Wyton were left as UK Lincoln bases.

In October 1952 aircraft from Nos. 83 and 97 Squadrons competed in Strategic Air Command's bombing competition at Davis-Monthan in Arizona while 45 Lincolns took part in the Queen's Coronation Review on 15 July 1953.

On 12 March 1953 RF531, from the Central Gunnery School, Leconfield, was shot down by MiG-15 jet fighters during a NATO liaison flight over Germany. The aircraft was flying towards Berlin on a routine 'Ranger' flight, designed to maintain the Allies' flying rights in the Berlin corridors, and was close to the British/Russian Zone border. It was the only Lincoln ever to be shot down and all the crew were lost. The incident, the worst of several harassments of Western aircraft in the area at that time, including other Lincolns, brought a worrying situation. For a period NATO aircraft flew fully-armed ready to fire back while Upwood's Lincolns went to armed standby; fortunately the crisis eased.

No. 230 OCU was the last survivor of the once extensive network of RAF heavy

No. 61 Squadron Lincoln RF555 seen over mountainous terrain in Kenya during the unit's tour against the Mau Mau between March and June 1954. (Alan Hall collection)

Lincoln B.Mk.30 A73-6 banks towards the camera. RAAF Lincolns retained a natural metal finish, initially with SEAC style Blue/white roundels and then from 1947 standard RAF pattern Type D roundels. On 8 June 1956 the red 'kangaroo in motion' insignia was authorised. This replaced the red centre in the Type D roundels on fuselage sides only and was soon applied to the Lincolns. The revised roundel was not authorised for use on mainplanes until 23 September 1965, by which time the last Lincoln had left the Service. (Alan Hall collection)

bomber conversion units and it provided bombing training and sea mining experience. In April 1952 it was split into two conversion flights for Nos. 1 and 3 Groups but reformed in August 1953 to supply the extra crews needed for the Malaya and Kenya operations. Waddington's aircraft moved to Wittering in August 1953 to make way for the forthcoming V-bombers as the Lincoln wind-down accelerated. No. 148 Squadron flew the final RAF Lincoln sortie in Malaya in April 1955 and No. 49 returned from Kenya in August, both disbanding soon after their arrival in Britain.

The remaining Lincoln squadron was No. 7 which still took part in exercises including the dropping of parachute mines off the Denmark coast in April 1955. When about to disband in November, some of its aircraft were urgently transferred to Aden and Bahrain; they eventually passed to No. 1426 Flight and No. 7 disbanded in December. Nos. 83 and 97 Squadrons disbanded around the same time having been used to train V-bomber navigators while No. 199 continued for a further period on Electronic Countermeasures (ECM) work (see later). Many Lincolns were sold for scrap between 1956 and 1959 although some airframes, including RF561, passed to the Proof and Experimental Establishment's range at Shoeburyness for use as artillery targets.

VARIATIONS

A proposed Mk.III Air-Sea Rescue Lincoln would have had a saddle tank for more fuel. Coastal Command was interested in the Lincoln and borrowed an example in September 1946 for trials, but the more advanced Avro Shackleton was eventually developed. It is believed that the proposed Lincoln B.Mk.IV of April 1947 had Merlin 85 engines but this never appeared. During October 1945 it was decided that half of one squadron, No. XV, would carry 12,000lb (5,443kg) 'Tallboy' bombs internally and deepened dished doors were fitted at Wyton giving a more bulbous outline. A further two and a half squadrons would stock these doors for modifying their aircraft if required. The Lincoln bomb compartment could have taken the 22,000lb (9,979kg) 'Grand Slam' bomb but on 25 April 1946 the decision was made not to convert any aircraft because of the cost.

The different standards of H2S radar were reflected by the designations given in February 1947 to Lincolns using it; the B.Mk.II/IIIG had H2S Mk.IIIG and B.Mk.II/IVA the larger H2S Mk.IVA with its bigger radome. Later the RAF switched from Roman to Arabic numerals and these versions became the B.Mk.2/3G and B.Mk.2/4A respectively; eventually they became B.Mk.2(3G) and B.Mk.2(4A). It was intended that all No. 1 Group squadrons should have the more advanced H2S Mk.IVA by June 1947 but, despite its priority, there were many problems and getting it into service proved a lengthy process. The first unit, No. 9 Squadron, received its equipment in June 1949.

Despite Lincoln's archaic appearance, it was realised that the type was likely to remain in front-line service for some years to come and a re-engined Lincoln 2 was considered with Merlin 626 engines. These would increase ceiling and improve performance but not range, so the variant could not get any further into Russia and the project was cancelled in February 1949. A turbo-

A posed picture of the crew of RAAF Lincoln A73-21 leaving their No. 1 Squadron aircraft. Note the missions against Malaysian terrorists recorded on the nose. (Alan Hall collection)

Avro Lincoln B.Mk.II SX926 of No. 61 Squadron, based at RAF Waddington, seen at the RAF Coronation Review, Odiham, July 1953.

No.61 Squadron badge

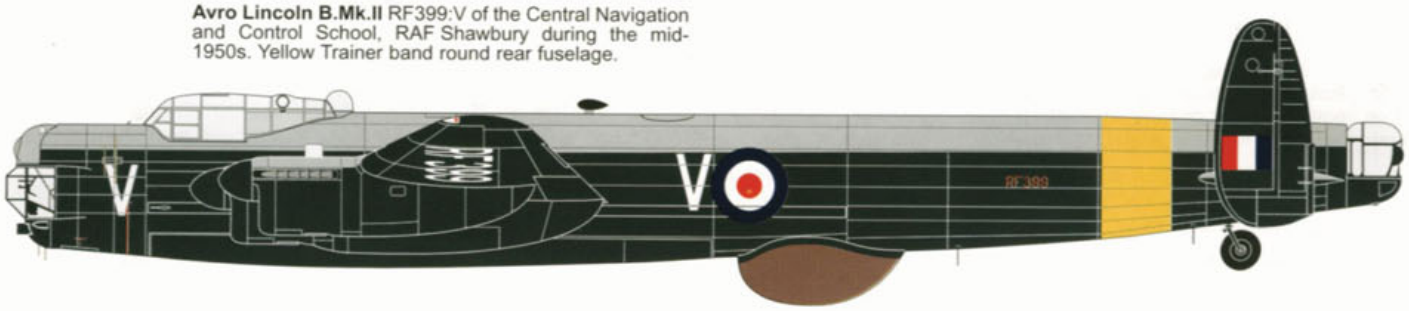
Avro Lincoln B.Mk.II WD131 of No. 199 Squadron, RAF Watton. Used for Radio Counter Measures duties in 1953. Blue and white spinners.

Avro Lincoln B.Mk.II SX982 of No. 7 Squadron, RAF Watton. On detachment to RAF Tengah, Singapore, for Operation Bold, anti-communist terrorist operations in January 1954.

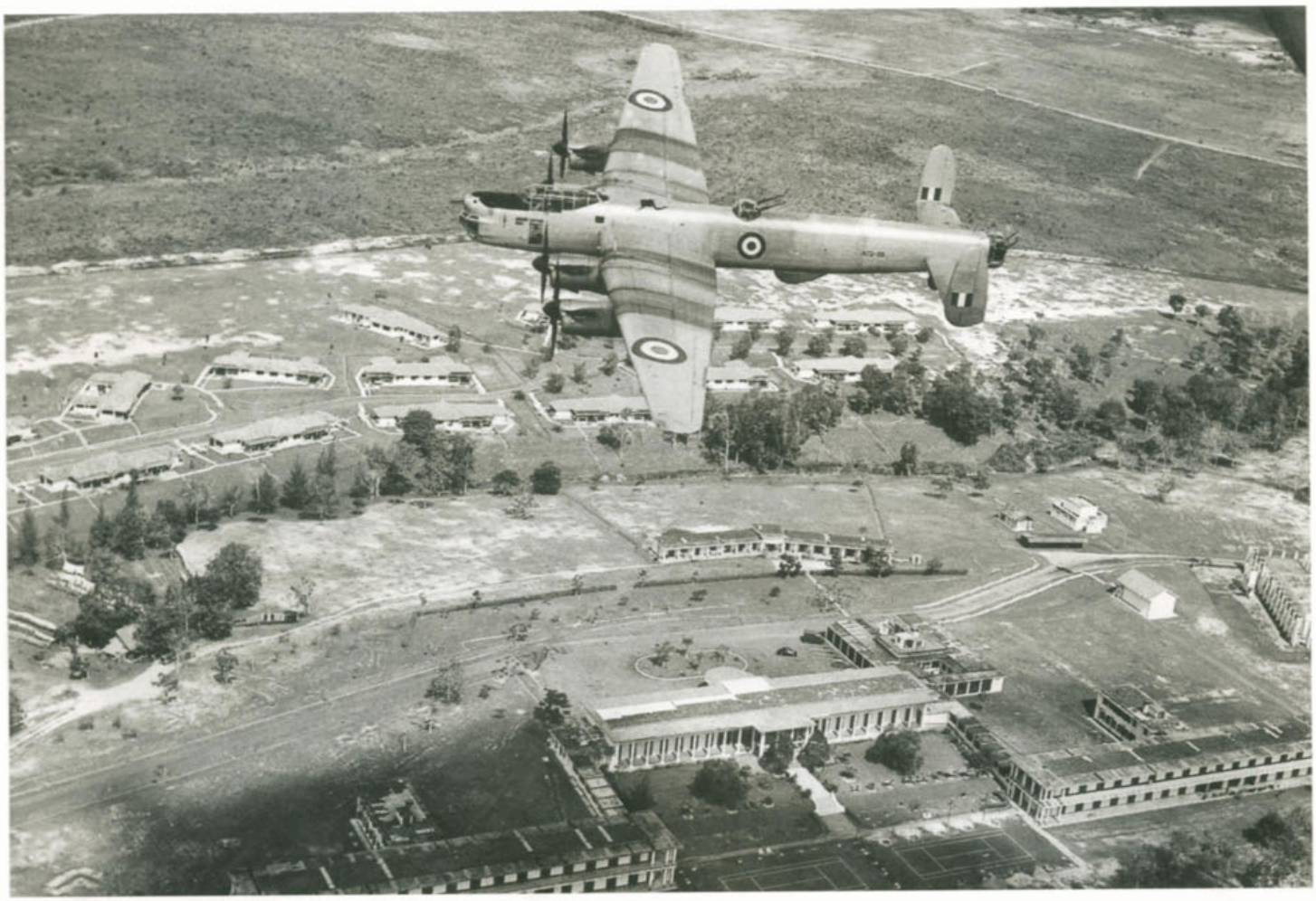
No. 7 Squadron badge

Avro Lincoln B.Mk.II RF555 of No. 61 Squadron from RAF Wittering on detachment to RAF Eastleigh, Kenya during anti-Mau Mau operations in 1954.

Avro Lincoln B.Mk.II RF399:V of the Central Navigation and Control School, RAF Shawbury during the mid-1950s. Yellow Trainer band round rear fuselage.



Avro Lincoln B.Mk.II SX925 of No. 97 Squadron based at RAF Hemswell in September 1955.



No. 1 Squadron's Lincoln A73-29 seen flying over the officer's mess at Tengah after returning from a strike. (Alan Hall collection)

prop B.Mk.V with Bristol Theseus units in the outer nacelles was also contemplated but discarded when it was realised nuclear-armed jet bombers were the way forward.

MALAYA AND KENYA

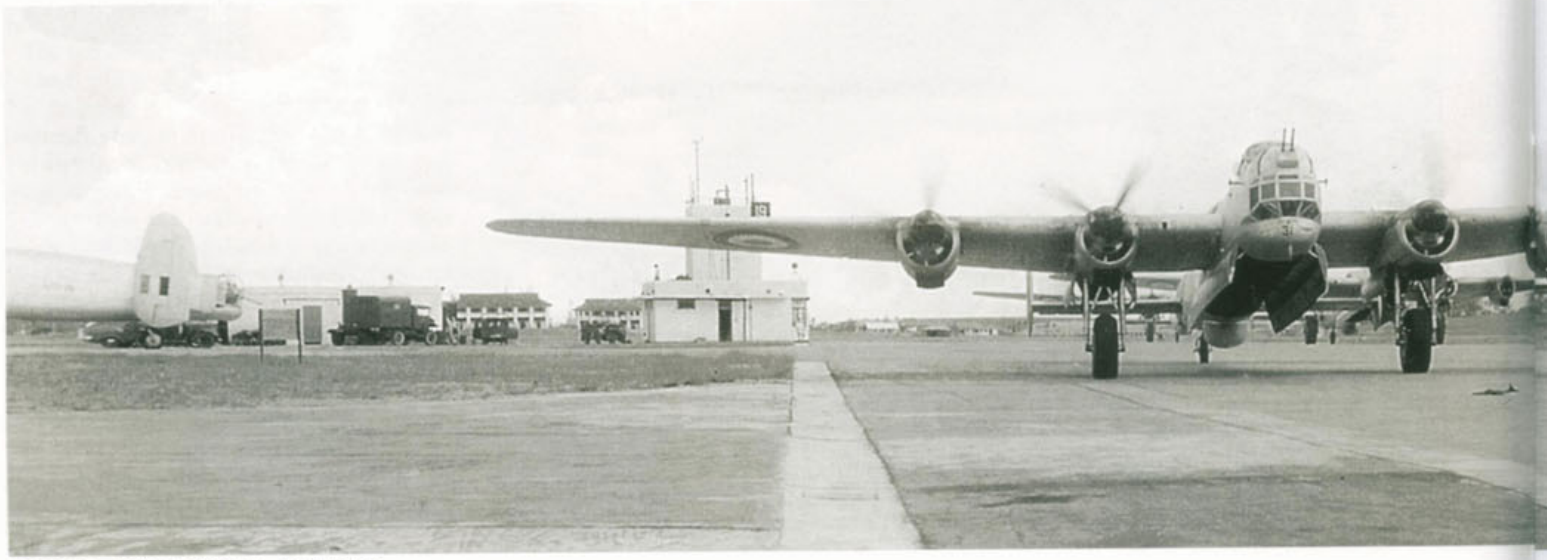
In late 1947 Nos. 101 and 138 Squadrons on a Sunray trip from the UK, were unexpectedly sent on to Khormaksar, Aden, to help deal with rebel tribesmen and they spent a week dropping 500lb (227kg) bombs against the Qutebi Tribe's 'capital', Thumier, in the Wadi Wahida. In February and March 1948 No. 57 Squadron repeated the process bombing and strafing Bel Harith tribesmen in Yemen.

The scene at RAF Tengah, Singapore, as three RAAF Lincoln B.Mk.30 aircraft line up for take off on another raid up country. Interestingly the bomb doors were left open whilst taxying. (MoD)

The ever growing activity of Communist terrorists in Malaya forced the commitment of Lincolns to the area in March 1950. No. 57 Squadron flew out to Tengah and almost immediately began intense bombing of terrorist camps under Operation Musgrave. H2S was useless over jungle so both day and night drops were aimed by eye, loads usually consisting of a 1,000lb (454kg) and 500lb (227kg) mix but occasionally a single 4,000lb (1,814kg) bomb was dropped. Raids comprised either pinpoint or area attacks, predominantly in daylight and often in formation and usually dropping at around 5,000ft (1,524m), followed by low-level strafing at about 500ft (152m) using the bomber's machine guns; the latter was considered most effective. The thick jungle often made pinpoint attacks by lighter aircraft difficult so area bombing proved a valuable alternative. In June No. 57 was replaced by No. 100, No. 1 Squadron RAAF joined a month later and in December No. 61 Squadron took over.

During December the RAF mounted Operation Jackpot against a group of over 100 terorists on the Selangor/Negri Sembilan border. Raids were made by Brigands, Spitfires, Tempests and Lincolns, the terrorists suffering over 50 casualties. During a one month period in February and March 1951, No. 61 dropped 196 1,000lb and 1,006 500lb bombs; the squadron left in April and no further RAF Lincoln unit arrived until No. 83 in spring 1953.

Marking techniques now improved using



Above: The extended nose of the MR.Mk.31 helped the variant to do a fine job as a maritime aircraft, though it did nothing for the Lincoln's appearance. The view shows A73-62. Right: Side view of long-nose A73-61. Note the dark livery over the upper nacelles. (Alan Hall collection)

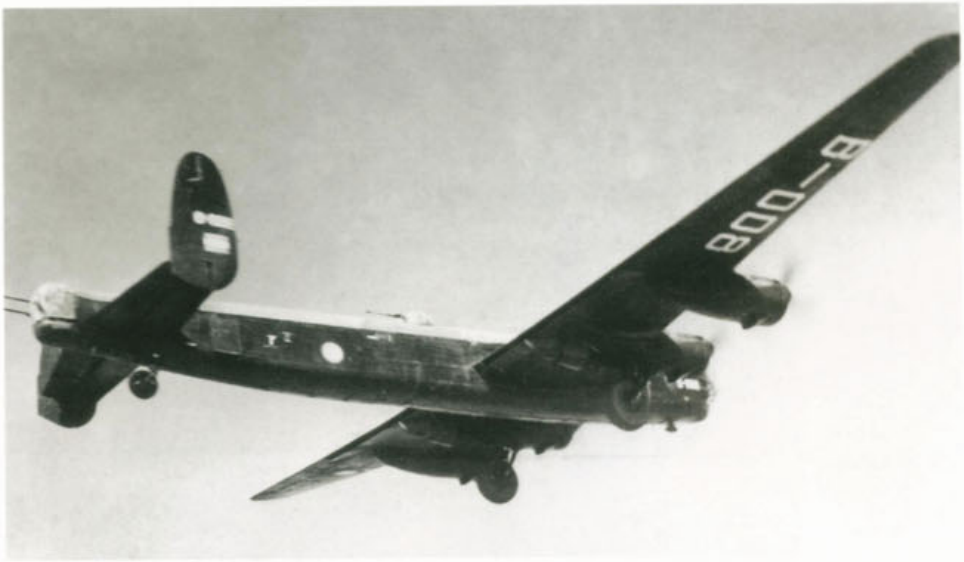
Austers to drop flares and occasionally all squadron aircraft, which lacked dorsal turrets, took part in a raid. If a sector was clear of all bar terrorists, a group of Lincolns could blanket bomb the whole area with Vampires or Hornets following up with rockets and cannon. Total air supremacy was a big help because day and night bombing could be carried out with little risk.

Diversions from normal routine included detachments to Hong Kong for mock combat with Vampires and Hornets from Nos. 28 and 80 Squadrons. Nos. 7 and 148 Squadrons took their turn in Malaya, after No. 83, before Lincoln operations ceased in April 1955 with the arrival of No. 101's Canberras; the last Lincoln strike was made on 2 April. No RAF Lincolns were lost in the campaign and, despite obsolescence, it proved ideal for the task.

The process was repeated from 1953 in Kenya after a group of land-hungry Kikuyu tribesmen, known as the Mau Mau, had claimed parts of the country and backed it with terrorism. A bombing campaign began after the arrival of No. 49 Squadron in November. The only major modification the Lincoln needed was the addition of tropical sand filters to the engine air intakes. Home base was Eastleigh, Nairobi, 5,500ft (1,676m) above sea level and without any landing aids so, with full loads and targets regularly in the mountainous Aberdare and Mount Kenya regions, the Lincolns were often approaching their operating limits. Fourteen 500lb bombs was the maximum permitted load in Kenya's hot conditions.

Bombing had to be visual and the clearest and best conditions were usually in the early morning since cloud would build up by midday, though an occasional night sortie was undertaken; the weather was always a problem. Often the Lincolns bombed in pairs, the targets for their 500lb and 1,000lb bombs including jungle hideouts and strongholds marked by light aircraft. On 30 November four No. 49 Squadron aircraft dropped 36 bombs in a particularly effective attack across a valley stronghold. Nos. 100, 61 and 214 Squadrons were alternatively deployed, and then No. 49 again, before operations closed in July 1955 with the Mau Mau effectively beaten. Ordnance supplies were often short and bombs were regularly collected from Aden and flown to Nairobi for the raids to continue.

Usual routine was to bomb with 1,000lb (454kg) from about 2,500ft (762m), or with 500lb (227kg) from as low as 1,000ft (305m), followed by ground strafing; Lincolns also undertook photo-reconnaissance. Kenya was so big that Lincolns occasionally moved 'up country' to more advanced, but remote, grass landing grounds. With the arrival of No. 214 pressure on the Mau Mau was increased and in August 1954 a mobile radar control post using an anti-aircraft radar was introduced as a semi-blind-bombing aid for bad weath-



Lincoln B.Mk.2 B-008 of the Fuerza Aerea Argentina was originally RAF RE355 though it never reached a squadron. It was destroyed in an accident in May 1963. (APN)

er. The bombing reached a peak in September and slowly began to have its effect pushing the terrorists back into the northern forests. Sortie rate gradually dropped and the last Lincoln operation against the Mau Mau was made on 16 July 1955. During the campaign four aircraft were lost in crashes or written off in landing accidents.

In January 1952 the safety of British subjects in Egypt was threatened and No. 148 Squadron was sent to Shallufa for support. No. 100 replaced it before returning in August when the crisis passed. No. 7 Squadron was about to disband in November 1955 when two of its aircraft were urgently transferred to Aden for colonial policing along the Yemeni border. More were detached to Bahrain to patrol the Saudi/Trucial border because the Buraimi Oasis oil development centre was under threat from the Saudis. In January 1956 these Lincolns became No. 1426 Flight, Khormaksar, and their operations included patrols for gun-running and border violations, occasional ground strafing plus air cover and support for forces on the ground. After a year the Flight was replaced by No. 37 Squadron's Avro Shackletons, the last operational flight taking place on 16 January 1957 when RE322 successfully strafed rebels who had trapped a convoy in a valley. The convoy was able to proceed and the Lincoln's operational RAF career was over.

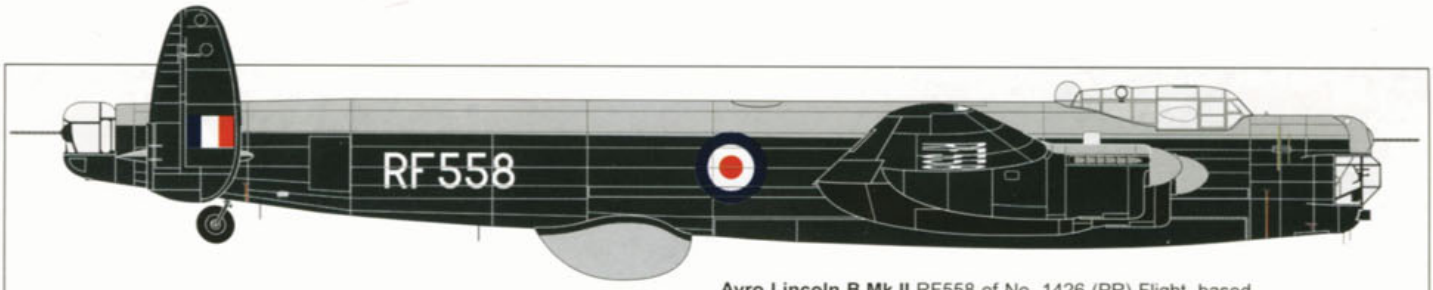
Lincoln B-022 at Buenos Aires in the 1960s after modification for transport work with a faired-in nose and tail. This is the most well known of Argentine Lincolns having been used for 'seeding' clouds to make rain during the 1950s and then in 1965 it made a famous flight to the South Pole. (APN)

SPECIAL UNITS

The Radar Reconnaissance Flight (RRF) was formed in October 1951 with Lincolns from No. 58 Squadron (No. 58 had RF331 and SX991 as 'PR.Mk.IIs' from November 1950). Its duties centred around developing radar for general reconnaissance purposes, for which the H2S's photographic capacity was considered valuable; in addition a target information library was produced for the forthcoming V-Bombers. The new technique of side-scanning radar was tested using H2S Mk.4 mounted at right angles to the aircraft's fuselage and then in 1954 RA656 trialed the side-scanning 'Green Cheese' radar. In July 1955 RF576, with its bomb-aimer's centre-front glass panel replaced by a metal plate with a homing aerial, moved to Malta for some air-to-sea guided weapon trials with the ex-heavy cruiser *HMS Cumberland*. Unit strength eventually reached four aircraft and the last pair left in August 1957 having worked alongside some Canberra jets which arrived in 1952. Long lonely flights were an RRF speciality.

RA633 and RE242 joined the Bomb Ballistics Unit at Martlesham Heath in 1948 and were fitted with high ratio superchargers to push their ceiling up to nearly 40,000ft (12,192m). RF342 and RF561 were used by TFU Defford for secret radar trials, RF561 receiving Merlin 86s for improved high altitude performance, a long rounded nose and radome and a streamlined rear fuselage; RF560 also had Merlin 86s when serving with TFU. Some of the aerodynamic trials for Britain's first atomic weapon, 'Blue Danube', were flown by a Lincoln over the marshes near Foulness and Flight Refuelling (FR) used Lincolns in two areas, airborne refuelling and drone targets. RA657 joined FR in September 1949 for trials with the 'probe and drogue' system trailing the fuel hose from the H2S radar position under the fuselage. Highlights included refuelling a USAF F-84 Thunderjet during its successful record-breaking first non-stop east-west Atlantic crossing on 22 September 1950, the prototype Comet airliner and then RAF trials during April 1950 with No. 245 Squadron's specially adapted Meteors.

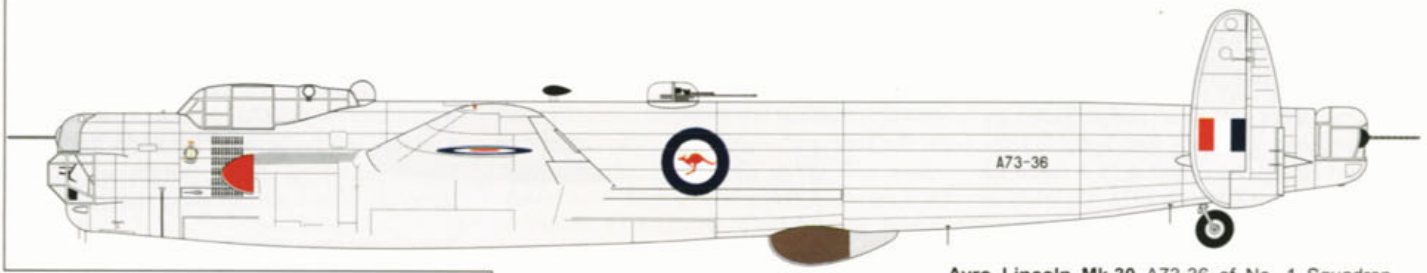
Having abandoned a drone Lancaster conversion, plans were raised to convert Lincoln Mk.2s into two U.Mk.5 pilotless target drone prototypes and then 20 'production' machines, FR having received RF538 in February 1954 for preliminary trials with RAE. Flight performance would be normal with landings, take-offs and manoeuvres under remote control but the machines would also be capable of normal crewed flight (no gunners). The first machine, RF395, arrived for conversion at Tarrant Rushton in March 1955 and first flew in modified form on 29 February 1956. Very



Avro Lincoln B.Mk.II RF558 of No. 1426 (PR) Flight, based at RAF Khormaksar, Aden in 1956.

Avro Lincoln B.Mk.II RF570 of Bomber Command Bombing School, RAF Lindholme in 1956

Avro Lincoln B.Mk.II RF505:K of No. 151 Squadron, Central Signals Establishment, RAF Watton in September 1962



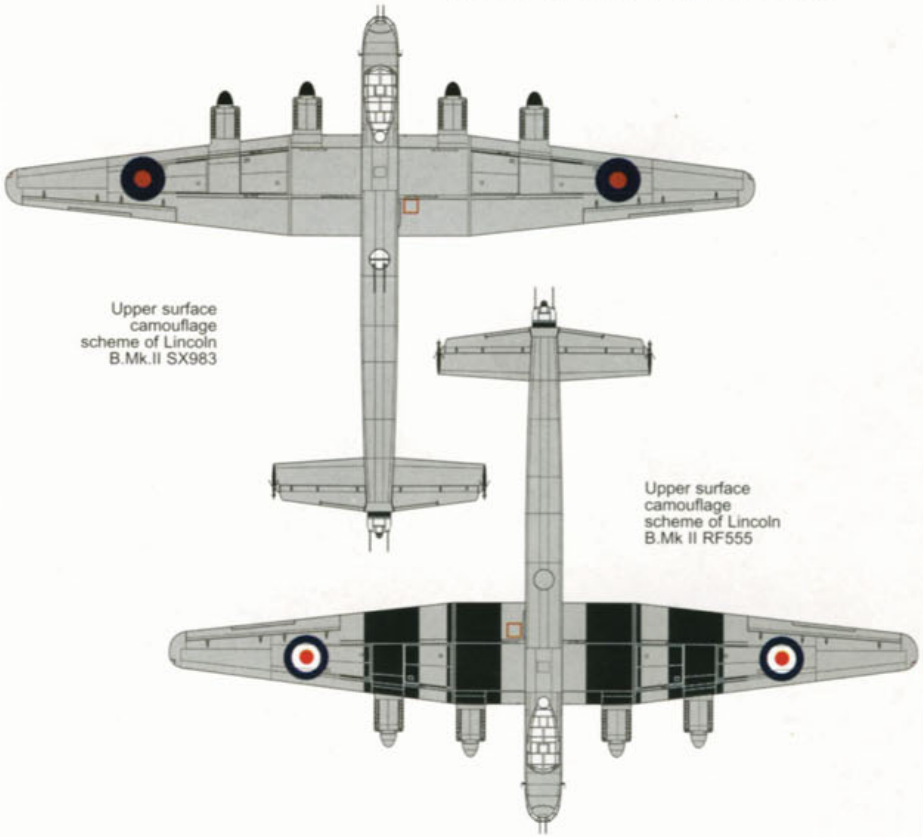
Avro Lincoln Mk.30 A73-36 of No. 1 Squadron, RAAF Tengah, Singapore, in the mid 1950s.

intensive flying followed with the first remotely controlled landing taking place on 10 May, but RF395 had never flown without a pilot when the programme was dropped towards the end of the year. A second 'reserve' prototype, RE366, arrived on 26 May but did not fly again.

The Long Range Weapons Establishment (LRWE), Woomera, Australia (which became the Weapons Research Establishment [WRE] in 1955), used Lincolns extensively for dropping bombs and filming. The RAAF's Air Trials Unit became involved in 1949 but their Lincoln's ceiling was insufficient so RAF aircraft, usually with Australian crews, took their place. Many Lincolns went to Australia and at least eight, including the Python test beds (see later), were scrapped there.

AUSTRALIAN LINCOLNS

RA648 went to Australia in March 1946 for evaluation by No. 1 Aircraft Performance Unit at Laverton, Victoria. In the meantime an order was placed with the Government Aircraft Factory, Fisherman's Bend, Melbourne, for 61 Lancaster Mk.IVs, which became the Lincoln B.Mk.XXX (later the B.Mk.30). Twelve Avro Tudors (to be A76-1 to A76-12) were also ordered but in July



Upper surface camouflage scheme of Lincoln B.Mk.II SX983

Upper surface camouflage scheme of Lincoln B.Mk II RF555

Three Bomber Command Bombing School Lincolns flying over Waddington in September 1961, RF398 nearest. (Peter Green)

1948 these were cancelled and replaced by more Lincolns. The first five were assembled from British parts and A73-1 made its maiden flight on 12 March 1946. On 24 May it passed to the Lincoln Development Flight at Laverton and the first all-Australian aircraft flew six months later. From A73-11 onwards, the aircraft received extra stringers in the roof and a stronger undercarriage to allow a 75,000lb (34,020kg) all-up-weight. A Lincoln Conversion Flight was established in mid-1947 and Nos. 1, 2 and 6 Squadrons formed on the type in February 1948 at Amberley in Queensland. A73-48, spent a short time in the UK in 1950.

Problems were experienced with the British Merlin 85B while the American Merlin 68 was not available, so British Merlin 66s were removed from stored Spitfire LF.Mk.VIIIs and fitted in the outer positions as a stopgap. These were short of power for hot conditions and lacked the necessary take-off performance for ancillary equipment such as hydraulic pumps for turrets, so the 85Bs had to remain in the inboard positions. Later the Merlin 102, built in Australia by Commonwealth Aircraft, was substituted on many aircraft. Some were re-engined with 102s in all positions, giving a 10 per cent improvement in performance, and fitted with stronger wing spars and skins to allow take-offs at 82,000lb (37,195kg). A73-41 was fully tested with Merlin 102s at Laverton from August 1949 to March 1950 and the modified aircraft were called B.Mk.30As. In 1949 A73-31 to 34, A73-36 to 40 and A73-42 to 46 were all modified for long range navigation duties, receiving extra radar, radio, instruments and a further crew station aft of the mid-upper turret.

No. 1 Squadron RAAF left No. 82 (Bomber) Wing in July 1950 to join RAF Lincolns at Tengah, Malaya, as part of No. 90 (Composite) Wing with No. 38 Squadron's Dakotas. Their operations mirrored the RAF sorties with full bomb loads dropped in daylight, occasionally in large formations with RAF aircraft, but solitary Lincolns would be used for night harassing flights dropping single bombs at regular intervals. Some aircraft were modified with

This Lincoln Mk.I, RA643, had a Bristol Phoebus jet fitted in the bomb bay in spring 1947. (Alan Hall collection)

Avro Lincoln units and representative aircraft

Prepared from articles published by Allan Williams in The British Roundel *published by the Roundel Research Group*

Royal Air Force

(Squadron/Unit	Dates: from-to	Code	Selected Serials
7 Squadron	8.49/12.55	MG	RE301, SX988, WD127
9 Squadron	7.46/5.52	WS	RA711, RF470, WD127
12 Squadron	8.46/3.52	PH	RA666, RE398, SX979
15 Squadron	2.47/10.50	LS	RF370, RF514, RF532
35 Squadron	8.49/2.50	TL	RF565, SX957, SX983
44 Squadron	10.45/2.51	KM	RF410, RF417, RF458
49 Squadron	10.49/8.55	EA	RA673, RE299, SX984
50 Squadron	7.46/1.51	VN	RF358, RF406, RF513
57 Squadron	8.45/5.51	DX	RE379, RF501, SX935
58 Squadron	5.51/10.51	OT	RF331, SX991
(became Radar Reconnaissance Flight)			
61 Squadron	5.46/8.54	QR	RE312, RF407, SX979
75 Squadron	8.45/10.45	AA	RF388, RF389, RF390
83 Squadron	7.46/1.56	OL	RA662, RF414, SX975
90 Squadron	4.47/9.50	WP	RE366, RF418, RF466
97 Squadron	6.46/1.56	OF	RA668, SX977, WD143
100 Squadron	5.46/4.54	HW	RA714, RF499, WD148
101 Squadron	5.46/6.51	SR	RA689, RF500, SX986
115 Squadron	7.49/3.50	KO	RE361, RE411, SX953
116 Squadron	8.52/4.54	-	SX956
(formed from CSE 'N' Squadron; used several aircraft types)			
138 Squadron	7.47/9.50	NF	RF361, RF413, SX951
148 Squadron	9.49/7.55	AU	RA666, SX952, WD127
149 Squadron	10.49/3.50	OJ	RA688, RA709, SX975
151 Squadron	1.62/4.63	-	RA685, RF398, WD132
(formed from CSE Signals Development Squadron; used several aircraft types)			
192 Squadron	7.51/3.53	-	SS715, SX980, WD130
(formed within Signals Command)			
199 Squadron	7.51/9.57	-	RA684, SX926, WD122
207 Squadron	7.49/3.50	EM	RE296, RE301, RE324
214 Squadron	2.50/12.54	QN	RA709, RE301, SX958
527 Squadron	8.52/3.57	-	RE325, SX948, WD147
(formed from CSE 'R' Squadron; used several aircraft types)			
617 Squadron	9.46/1.52	KC	RA711, RF477, SX936
230 OCU	2.49/2.57	SN	RA686, SS717, WD149
(became Lincoln Conversion Flight 6.55)			
BCBS	12.52/10.60	-	RA681, SS717, SX970
(Bomber Command Bombing School)			
BCIS	6.46/8.48	WB	RE283, RF481, RF504
(Bomber Command Instructors School - became Bomber Command Instrument Rating and Examining Flight 6.47)			
CBE	2.46/10.49	DF	RA686, RF559, SX948
(Central Bomber Establishment - Lincoln service trials)			

Lincolns were also operated by A&AEE Boscombe Down, Airborne Forces Experimental Establishment, Armament and Instrument Experimental Unit, Bomb Ballistic Unit, Bombing Development Unit, Bombing Trials Unit (1948-1961), Central Gunnery School, Central Navigation and Control School, Central Signals Establishment (CSE 8.46-4.63), Coastal Command Gunnery School, Empire Air Navigation School, Empire Central Flying School, Empire Radio School (4.47-4.50), Empire Test Pilots School, Ferry Training Unit, Long Range Weapons Establishment, Radar Reconnaissance Flight (RRF 10.51-8.57), RAE Farnborough, RAF Flying College (7.49-3.60), RAF Technical College, Special Installation Unit, Telecommunications Flying Unit (TFU 3.45-12.48) and Nos. 1321 (10.57/3.58), 1426 (1.56/1.57) & 1689 Flights.

Royal Australian Air Force

1 Squadron	2.48/7.58	-	A73-29, A73-50
2 Squadron	2.48/12.53	-	A73-25
6 Squadron	2.48/7.55	-	A73-31, A73-46
10 Squadron	3.49/6.61	-	A73-12, A73-66
11 Squadron	1949	-	A73-58

Nos. 1, 2 and 6 Squadrons formed No. 82 (Bomber) Wing which operated a centralised pool of aircraft for the three units; maintenance was carried out by No. 482 Squadron. Only Nos. 10 and 11 Squadrons, and sometimes No. 1 after moving to Tengah, ever 'owned' their aircraft. Lincolns were also operated by the Lincoln Development Flight, Crew Conversion Unit (Heavy Bomber) (from mid 1947), Aircraft Research and Development Unit (9.47-1959; was No. 1 Aircraft Performance Unit until 9.47), Central Flying School, the Air Trials Unit and the Schools of Air Navigation, Air Armaments and Photography.

Fuerza Aerea Argentine

Aircraft operated with 1 Regimiento de Bombardeo (First Bomber Regiment) from 2.48 until 12.65 which comprised two Units, R.1.Bom. and R.2.Caz. The Force's Lincolns were maintained by Grupo Technico 5.

racks to take four rocket projectiles under each wing tip for more pin-point attacks. No. 1 Squadrron stayed until July 1958, latterly working with RAF Canberras, and in the later stages of the campaign more night sorties were flown as the terrorists were pushed back, the constant air attacks wearing them down. The night raid Lincolns, single or in groups of three, located their targets with ground-controlled radars.

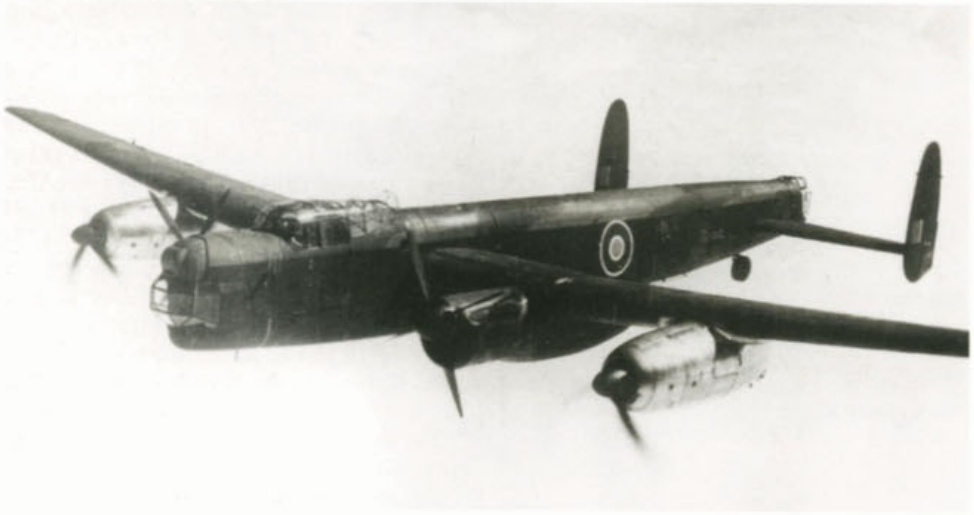
Nos. 2 and 6 Squadrons maintained Australia's home defence and in 1953 also became involved with the trials of Britain's atom bomb, their aircraft being used to track and analyse the resultant nuclear cloud. No. 6 eventually became the equivalent of an Operational Conversion Unit before both squadrons had their Lincolns replaced by (A84) Canberras. After No. 6 had converted in July 1955 the surviving aircraft went to the Lincoln Conversion Flight to train crews for No. 1 Squadron still in Malaya.

Australian Lincolns used for research included the School of Air Navigation's A73-2 *Nyhuan* and A73-15 *Brenool*. To test new navigation equipment, their turrets were removed and faired over which, with highly polished, natural metal surfaces added about 20mph (32km/h) to *Nyhuan's* maximum speed; additional fuel tanks gave extra range for very long training flights. A73-8 joined the Air Armament School at Gundawarra for bombing and gunnery training while the Aircraft Research and Development Unit (ARDU), an Australian equivalent to Britain's RAE and A&AEE together, used about 20 per cent of all Australian Lincolns at different times. A73-29 was used in rainmaking experiments from 1956 to 1959 while A73-24 was used to measure cosmic radiation. Finally A73-14 and A73-18 had all their armament removed and received windows and seating to carry passengers.

The RAAF's biggest mark on Lincoln history was the long nose Mk.31. In March 1949 No. 10 Squadron was reformed to carry out maritime patrol, search and rescue duties. Standard B.Mk.30s were used with Bristol B.17 mid-upper turrets refitted, but they were not ideal so some examples received a 6ft 6in (1.2m) nose extension. Prototype A73-48's conversion was completed in January 1953 and during the year No. 10 operated both marks until the B.Mk.30 was phased out. The conversions were done at Fisherman's Bend but some were produced as new aircraft because they were altered before completion. Initially equipped for general reconnaissance, several GR.Mk.31s were then further modified to carry anti-submarine weaponry as MR.Mk.31s. The first deliveries came in December and they filled the role very well, their unit becoming No. 10 (MR) Squadron. The last all-new Lincoln was delivered on 23 September.

The MR's H2S radar was modified as the ASV.Mk.7 which proved poor since it could not spot a periscope and its range was only 30 miles (48km). Loads included bombs (airborne torpedoes were tested), markers and sonobuoys, the latter sinking 50ft (15.2m) beneath the surface to listen for submarines. The standard 400gal (1,819lit) overload tank was replaced by two jettisonable 187gal (850lit) tanks to make more room while food and medical supplies could also be dropped if required. All bar the nose guns were removed by October 1957. MR.Mk.31s would often exercise with RAAF Canberras and the carrier *HMAS Sydney*, homing the bombers in at 30,000ft (10,668m). The Lincoln would approach at low level and when the carrier's Sea Fury fighters were scrambled, furious tail chases often resulted with the bomber occasionally getting behind a fighter. Anti-submarine patrols might last up to 15 hours.

Another unit, No. 11 Squadron, briefly



Left: B.Mk.I RE284 received a scaled-down model of the Brabazon airliner's Messier multi-wheel bogie undercarriage. It is seen on 10 September 1949 at Farnborough. (Peter Green) Lower left: RA716/G had Bristol Theseus turbo-props in the outer nacelles. In April 1947 test pilot A.J. 'Bill' Pegg, flying at 120mph (193km/h), formated the aircraft on an Oxford for this photograph to be taken. Note that the inner Merlins are feathered. (Eric Myall)

operated maritime Lincolns before receiving Lockheed Neptunes. No. 10 flew its Lincolns until corrosion in the main spar grounded the type in June 1961, the very last RAAF Lincoln flight taking place on 14 June when A73-65 was flown to Darwin for fire-fighting practice. The unit received P2V-7 Neptunes as replacements and the Lincolns were either used for fire-fighting or went for scrap. A design study was made in 1952 for an MR.Mk.32 but this never reached hardware; it would have been fitted with a radar and Magnetic Anomaly Detection (MAD) tails similar to the Neptune's. No Australian Lincoln was preserved but A73-27's nose survives in the Museum of Aviation at Camden Airport, Sydney.

ARGENTINA

The third country to operate Lincolns was Argentina. The Fuerza Aerea Argentina wanted a strategic bomber force and, after negotiations in 1946, officials visited Binbrook in 1947 to view RAF machines. Thirty aircraft were ordered comprising a dozen ex-RAF stored as surplus at Langer since delivery in autumn 1945 and 18 new-build aircraft from AWA Baginton. The former had been sold back to Avro in June 1946 and needed some refurbishing. They arrived in Argentina between September 1947 and February 1948 as standard B.Mk.IIs except

Left: In 1955 RA716 had both Theseus replaced by Avon turbojets. In this shot the aircraft is seen at Hamble. Below: Theseus test-bed RE418 warming up at RAF Lyneham on 21 May 1948 before making the inaugural scheduled service between Lyneham and the Middle East. The aircraft was loaned to Transport Command to build up its turboprop experience. (Peter Green)

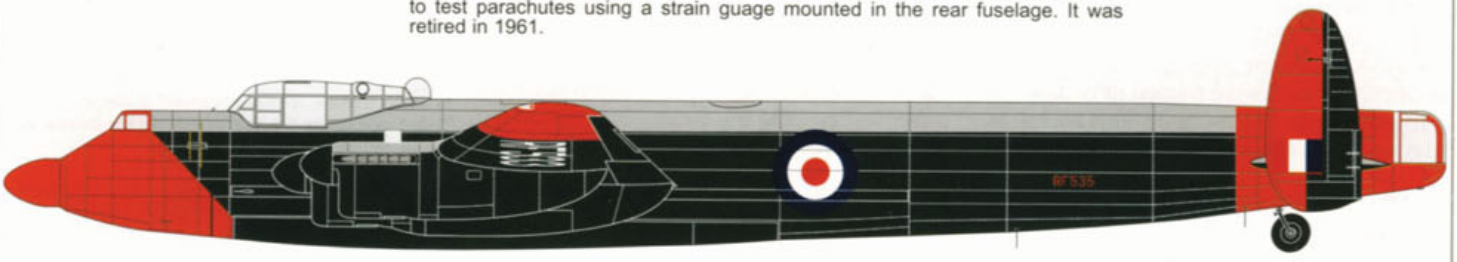
Avro Lincoln B.Mk.II RF402 acquired by Napier Icing Research to evaluate the anti-icing system on the Napier Naiad engine.

Avro Lincoln B.Mk.II SX971 used by Rolls Royce to test the Derwent turbo jet engine in the late 1940s. Natural metal overall apart from middle to rear fuselage painted black to avoid engine emissions.

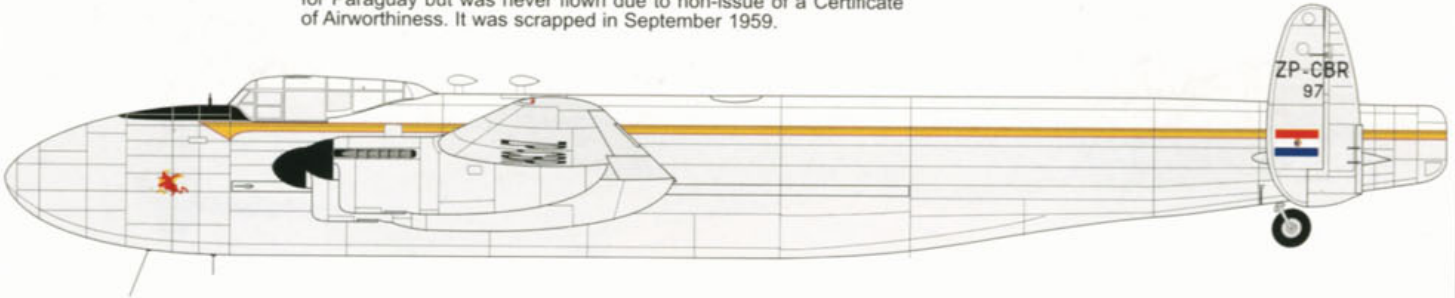
Avro Lincoln B.Mk.II RA716 used to test two Rolls Royce Avon engines mounted in Nos. 1 and 4 positions under the wings. Most experimental work conducted in the early 1950s.

Avro Lincoln B.Mk.II RF402 later in its career was used by Napier Icing Research to evaluate the anti-icing system on the Blackburn Beverley's wing tip during 1956.

Avro Lincoln B.Mk.II RF533 was formerly with the Telecommunications Flying Unit at Defford in 1948 but was converted as a flying radar laboratory by RAE Farnborough for a variety of radar and radio trials in the 1950s. It was then used to test parachutes using a strain guage mounted in the rear fuselage. It was retired in 1961.



Avro Lincoln B.Mk.II ZP-CBR:97. Converted as a meat transport for Paraguay but was never flown due to non-issue of a Certificate of Airworthiness. It was scrapped in September 1959.



Above: As Napier's Icing Research aircraft, RF342 received civil registration G-APRJ and is seen at the September 1959 SBAC Farnborough Show complete with spray rig and test wing section above the rear fuselage. (Eric Morgan) Left: G-APRJ was later renumbered G-29-1 and then G-36-3 when it went to Cranfield in 1962. (APN)

the H2S and other navigation equipment were removed. AWA's aircraft, designated Mk.2A, were delivered between August and November 1948. The first machine, serial B-001, arrived at Moron, near Buenos Aires, on 19 September 1947 in time for an aeronautical exhibition and aircraft began joining the 1st Bombardment Group in February 1948, the unit working up to operational status by April. Some Argentine aircrew and maintenance staff were trained in Britain.

Together with 15 Lancasters, this completed Argentina's strategic bombing arm. These aircraft were based right across the country and patrolled its long coastline for smugglers, as well as offering long range support and transport. Regular sorties were made over the country's bombing ranges and during 1953 B-022, using a camera in the crew access hatch under the nose, photographed various regions of Argentina to help the Military Geographical Institute to map the country. The Lincolns were also active during the rebellions against the Peron regime in September 1955 but the closest they came to aggressive 'action' was on 25 February 1960 when B-029 and B-020 assisted three Navy frigates to find and then track visually an unidentified submarine in the Gulfo Neuvo.

A maritime reconnaissance (MR) Lincoln was proposed for Argentina by Avro during the mid-1950s and would have carried nine crew, an Ekco ASU1963 radar in a retractable scanner housing under the fuselage, sonobouys and depth charges in the bomb bay; the mid-upper and rear turrets were faired over. Despite one aeroplane returning to Britain for a trial fitting and plans to convert 11 more at home, Argentina abandoned the project and bought the Lockheed Neptune instead.

In order to support the Argentine's Antarctic Research Teams, two Lincolns were specially adapted as long range transports in a very similar way to the RAF's Aries series. In 1948 B-003 was fitted at Langer in the UK with seating for 12 pas-

In 1948 B.Mk.II RF402 received a dummy Napier Naiad engine and water spray rig for intake icing research. (Alan Hall collection)

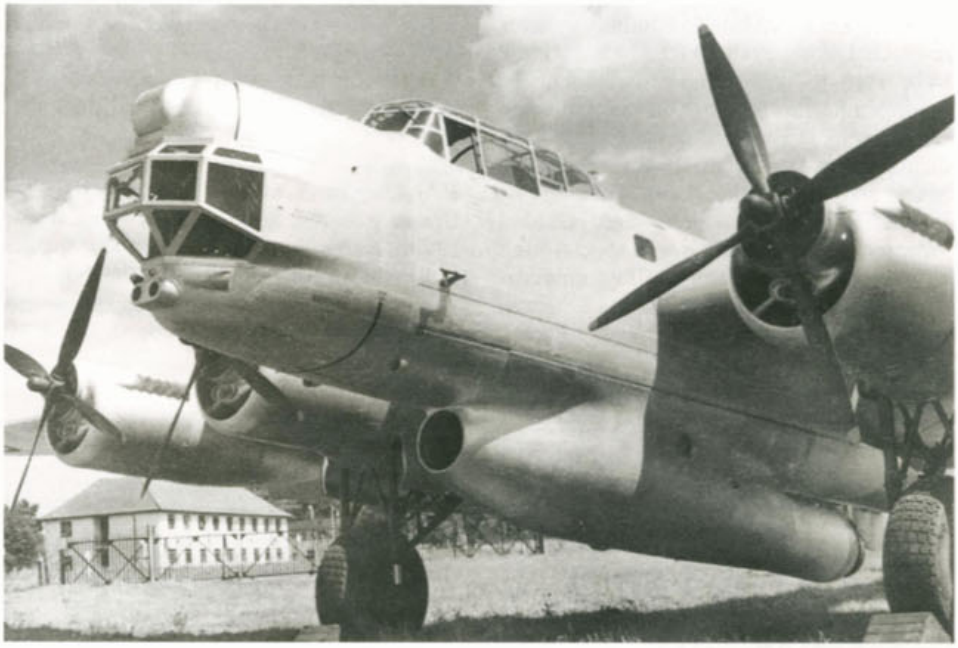
sengers and space for freight in the nose and tail cones. This Lincolnian first flew in converted form in July 1948 and was delivered seven months later; civil registration LV-ZEI had been allocated when it was overhauled at Langer in 1953. Named *Cruz Del Sur*, it crashed in 1961 but a second conversion, B-022 fitted with long range fuel tanks in the bomb bay and painted white with a dark coloured nose, was still flying four years later. On 27 October 1965, during a remarkable 20.5 hour flight, this aircraft made the furthest penetration across the Antarctic polar circle of any Lincoln when it delivered spares for a stranded C-47 to a base near the South Pole. Six were still in service at the end of 1964 but most were grounded by July 1966 to be replaced by the A-4 Skyhawk. The last Lincoln flight in Argentina was made at a ceremony on 1 August 1967 and serials B-004 (as B-010) and B-016 (as B-017) are preserved at the National Aeronautical Museum and Pringles Air Base respectively.

LINCOLN TEST BEDS

The Lincoln's reliability, solid construction, altitude performance and ample fuselage space for flight observers and their equipment made it ideal for research work. The Central Bomber Establishment operated a number of Lincolns including two in highly polished natural metal finish, RF498 *Crusader* and RF484 *Excaliber*, which had bunks, an astrodome replacing the dorsal turret and the most modern radar and bombing equipment. In 1947 a stored B.Mk.1, RE284, was loaned to Bristol Aircraft to be fitted with a scaled down version of the Brabazon airliner's Messier bogie undercarriage. Taxi trials began on 21 February with the first take-off and flight on 7 March.

Several aircraft found their way to RAE

Above: RF403 was the second Lincoln to receive Pythons and it replaced RE339 in the research programme. It later went to Woomera and was scrapped at RAAF Tocumwal in 1958. Below: Close up of SX971's Derwent installation. The reheat pipe is most distinct. (Peter Green)



Avro Lincoln MR.31 A73-57 of No. 10 Squadron RAAF, Townsville in the mid 1950s. Used for maritime patrol duties.

No. 10 Squadron RAAF badge

Avro Lincoln B.Mk.II B-022. Ex-RAF stock, used by Fuerza Aerea de Tareas Antarticas (FARA) Argentine Air Force in the early 1960s for long range flights over Antartica.

Farnborough for radar and bombing systems research. During 1948-49 RE394 and RF368 were used to drop a new rocket-assisted bomb similar to 'Tallboy' on the redundant U-boat pens at Bremen. In separate experiments from December 1949, RA633 (a Mk.1) and RF561, fitted with Merlin 114s, joined RAE's Armament and Guided Weapons Flight to drop some special high altitude stores over Cardigan Bay; on occasion they reached 42,000ft (12,802m). WD125 was delivered new to RAE's Armament Flight in July 1950 where it eventually sported an 'LMS Railway Red' paint scheme which helped with identification and observation during the dropping of secret weaponry. It was sold for scrap in November 1958.

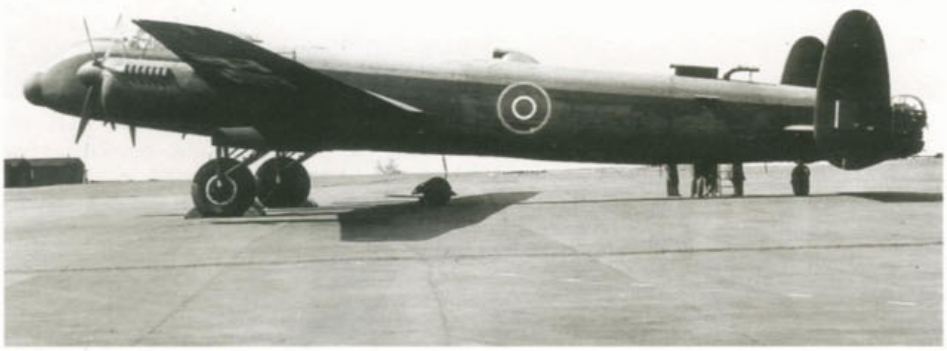
Those Lincolns used as engine test beds or in specific areas of research were as follows:-

RA643 had a single 2,450lb (10.9kN) Bristol Phoebus turbojet fitted in its bomb bay by Napier in the spring of 1947. It flew to Bristol for trials on 22 July 1948 but only 23 hours flying were completed before the Phoebus was abandoned to be replaced by the Olympus.

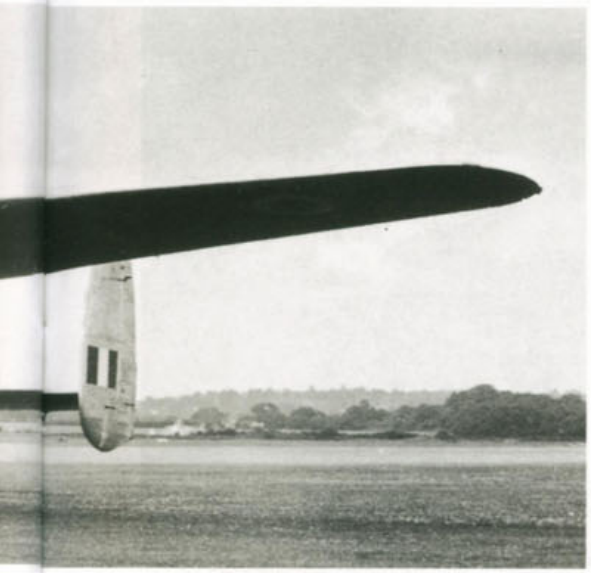
RA716 had Bristol Theseus 13 turboprops of 2,400hp (1,790kW) and 800lb (3.6kN) jet thrust fitted at Filton in the outer positions during 1946. It flew on 17 February 1947, the first air test of a British gas turbine specifically designed for driving a propeller. The Merlin nacelles were removed completely and new nacelles constructed to attach to the existing brackets. The Theseus's 13ft (3.96m) diameter de Havilland airscrews rotated in the opposite direction to the remaining Merlins so the engines countered one another, but this did not eliminate torque since Theseus delivered more power than Merlin. It was intended to replace all four Merlins with these units. RA716's fuel system had to be rearranged; the intermediate and outer wing tanks supplied kerosene to the jets while the inner tanks housed petrol for the Merlins. On take-off it was customary to set the Theseus at 5,000rpm and open up the Merlins first, but all four engines could be opened together. When throttled back a turbo propeller goes into coarse pitch so, from a safety point of view, the propeller turbine showed a tremendous advantage over the piston engine, particularly with a failure at take-off, because the loss of jet power did not result in the large increase of drag caused by a windmilling piston propeller in fine pitch.

Development trials totalled 165 hours and there were displays at the 1947 Farnborough Show. In 1955 the Theseus units were replaced at Air Service Training Ltd, Hamble, with much lighter Avon turbojets (losing the propellers saved weight). RA716 flew again in March and in this form could fly at 43,000ft (13,106m) with a 10,000lb (4,536kg) bomb load although the lack of pressurisation usually limited flight to 35,000ft (10.668m).

RE339 received 2,180hp (1,626kW) Theseus 21s in the outer nacelles at Filton in 1948. Displays at the September Farnborough Show were followed by intensive trials with the Theseus Lincoln Flight at Lyneham. The Theseus units were then replaced with Armstrong Siddeley Pythons by Air Service Training in 1950-51, the aircraft becoming airborne again on 10 July 1951. RE339 was used to drop live and dummy examples of the V-bomber's 'Blue Steel' guided missile bomb from 43,000ft and was then reworked as a bomber with tur-



Above: Lincoln RF402's Nomad was removed later in its test programme but this view taken on 29 April 1953 shows an air intake protruding above the fuselage. (Avro Heritage) Below: RF530 had a Napier Naiad fitted in its nose in 1946. Note the jet pipe beneath the cockpit. (Alan Hall collection)



Left: In 1951 RE339/G had its Theseus units replaced by two Armstrong Siddeley Python turboprops in the outer nacelles with contra-rotating propellers. Note the all-metal finish. (Air-Britain Library)

rets and three crew before going to Woomera in August 1952 for use in high altitude bomb ballistic trials with 'Tallboy' and special store weapons.

RE418 had Theseus 21s in the outboard nacelles and was loaned to Transport Command in May 1948 to provide turboprop experience on scheduled services. There it completed over 800 hours flying before subsequently being fitted with Armstrong Siddeley Pythons. RE418 also spent nine months at Woomera.

RF342 joined Napier on 16 August 1955 to continued the icing research programme begun with RF402 (detailed later). Fitted with four 200gal (909lit) fuselage water tanks, it tested Beverley, Britannia, Comet and Caravelle wing tips and a Buccaneer tail section. RF342 became civil G-APRJ on 29 December 1958 and then Class B registration G-29-1 in 1960. On 29 October 1962 it flew to the College of Aeronautics, Cranfield, to replace Lancaster PA474 on aerofoil trials work, receiving Class B registration G-36-3, and in 1964 it tested a laminar flow wing mounted vertically above the mid-fuselage.

RF368 was used for a trial installation of Armstrong Siddeley Proteus turboprops in its outer nacelles. These were ground tests only; RF368 never flew again.

RF402 had a dummy Napier Naiad turboprop fitted in the nose in 1948 in preparation for engine de-icing trials, using a water spray rig, by Napier's Icing Research Unit. In 1956 Napier fitted its Spraymat 36-nozzle 'washboard' water spray system above the fuselage with the water coming from two 60gal (273lit) tanks in the bomb bay. An aerodynamic 'wing' section was mounted vertically about 6ft (1.83m) behind ready for an assessment of the ice-protection systems employed on the aircraft concerned; sections tested included the Caravelle airliner and Beverley transport. In each test the section was pivoted on a vertical axis through an 'angle-of-attack' range, which for the Beverley covered minus 1.5degrees. to plus 10.5degrees, and by varying the angle and RF402's airspeed it was possible to simulate various operating conditions. Hot air for the wing section came from a Lucas heater in the rear fuselage with air for circulation and combustion entering through a large intake aft of the 'wing'; combusted gases were exhausted at the fuselage rear. A two-stage supercharger on the port outer Merlin fed compressed air to the water spray nozzles to give the necessary atomisation. Wing types tested were recorded on RF402's nose and the machine became the most versatile 'ice

Right: Lincoln SX973 had the enormous Napier Nomad turbo-compound diesel fitted in its nose in 1952, complete with contra-rotating propellers. (Eric Myall) Below: From 1956 Lincoln RF402 was used on a series of anti-icing trials and eventually became G-APRP. The photograph was taken in July 1956. (RAF Museum)

Above: Lincoln RF530 was refitted with a Rolls-Royce Tyne turboprop in its nose and flew in June 1956 registered as G-37-1. It retained its natural metal finish (Bill Harrison) Centre: Lincoln RF533 spent its entire career doing research and received a special nose designed to take all known air-interception radomes. It is seen here at Farnborough in July 1955. (Peter Green) Below: When its active experimental life was completed Lincoln RF533 ended its days with the Stansted Fire School. (Peter Green)

wagon' to be developed in Britain to date. It was allocated civil registration G-APRP but was eventually cannibalised to keep G-APRJ (ex-RF342) flying.

RF403 had Armstrong Siddeley Python turboprops fitted in the outboard nacelles by Air Service Training and was used by the Armament and Instrument Experimental Unit's Ballistics Trials Flight to drop live

From October 1950 Lincoln SX971 tested a Rolls-Royce Derwent jet fitted with reheat. This view was taken at Hucknall. (Bill Harrison)

and dummy 'Blue Steels'. It flew to Woomera in February 1954 for high altitude ballistics trials and could fly at over 40,000ft (12,192m), the Pythons giving a vastly superior rate-of-climb over standard Lincolns. At Woomera the Python Lincolns were intended to carry the 'Red Rapier' pilotless flying bomb beneath their fuselages, but the weapon was cancelled.

RF530 received a 1,600hp (1,193kW) Napier E.128 Naiad turboprop in its nose in late 1946 but the project was abandoned when Blackburn's YB.1 anti-submarine aircraft was cancelled in favour of Fairey's Gannet. Transferred to Rolls-Royce on 27 August 1954, RF530 had an early development 4,500hp (3,357kW) Rolls-Royce RB.109 Tyne turboprop, with 14ft 6in (4.4m) de Havilland propeller, fitted in the nose for the Vanguard airliner's development programme. It was re-registered G-37-1 and flew from Hucknall on 28 June 1956. At the Farnborough Show in September it flew on the Tyne alone with all four Merlins feathered. In June 1959 an icing spray grid was fitted around the Tyne with hot air supplied by a Palouste jet engine in the tail. The aircraft's last flight was made on 27 March 1962.

RF533 joined TFU Defford in 1948 as a flying laboratory for radar and fire control development. In June 1952 it rejoined Avro and had a special nose fitted designed to take all known radar air-intercept (AI) radomes and then on 7 May 1954 it went to RAE Farnborough for trials. In October the work was extended to cover the testing of windscreens in rain. From July 1955, RF533 tested parachutes and target banners at RAE before being struck off charge in May 1961. It was transported to Stansted on 27 June to join the Fire Fighting School.

Lincoln RF533 during its final sortie from RAE on 21 April 1961. For several years it had been used to test the strength of parachutes for ejector seats, to drop mines or to off-load stores from Beverley transports. Test chutes were dropped through the rear fuselage and towed on a 40ft (12.2m) strop which was strain-gauged to measure the applied loads; this is visible in the photo. RF533 tested 1,207 parachutes in 444 flights. (RAE)

SX971 was adapted by Air Service Training for Rolls-Royce Derwent reheat trials on behalf of the National Gas Turbine Establishment (NGTE), receiving a single Derwent in a special pod under the fuselage; as modified it flew on 13 September 1950. The lower fuselage was sheathed with stainless steel to protect it from afterburner heat and twin retractable tail wheels were fitted. The aircraft served with the NGTE Flight at Bitteswell from May 1951; the unit moved to Farnborough in August 1952 and SX971 flew until 1956.

SX972 received 3,200hp (2,386kW) Armstrong Siddeley Proteus turboprops in its outer nacelles. It first flew on 12 December 1950 and completed 958 hours of test flying.

SX973 had a 3,000hp (2,237kW) Napier Nomad I compound diesel-gas turbine mounted in its nose and flew at the 1952 Farnborough Show with all Merlins stopped; its trials were finished in 1954. Avro Type 717 was allotted to a planned Lincoln test bed with two Nomads but the engine was abandoned for more advanced turboprops and pure jets.

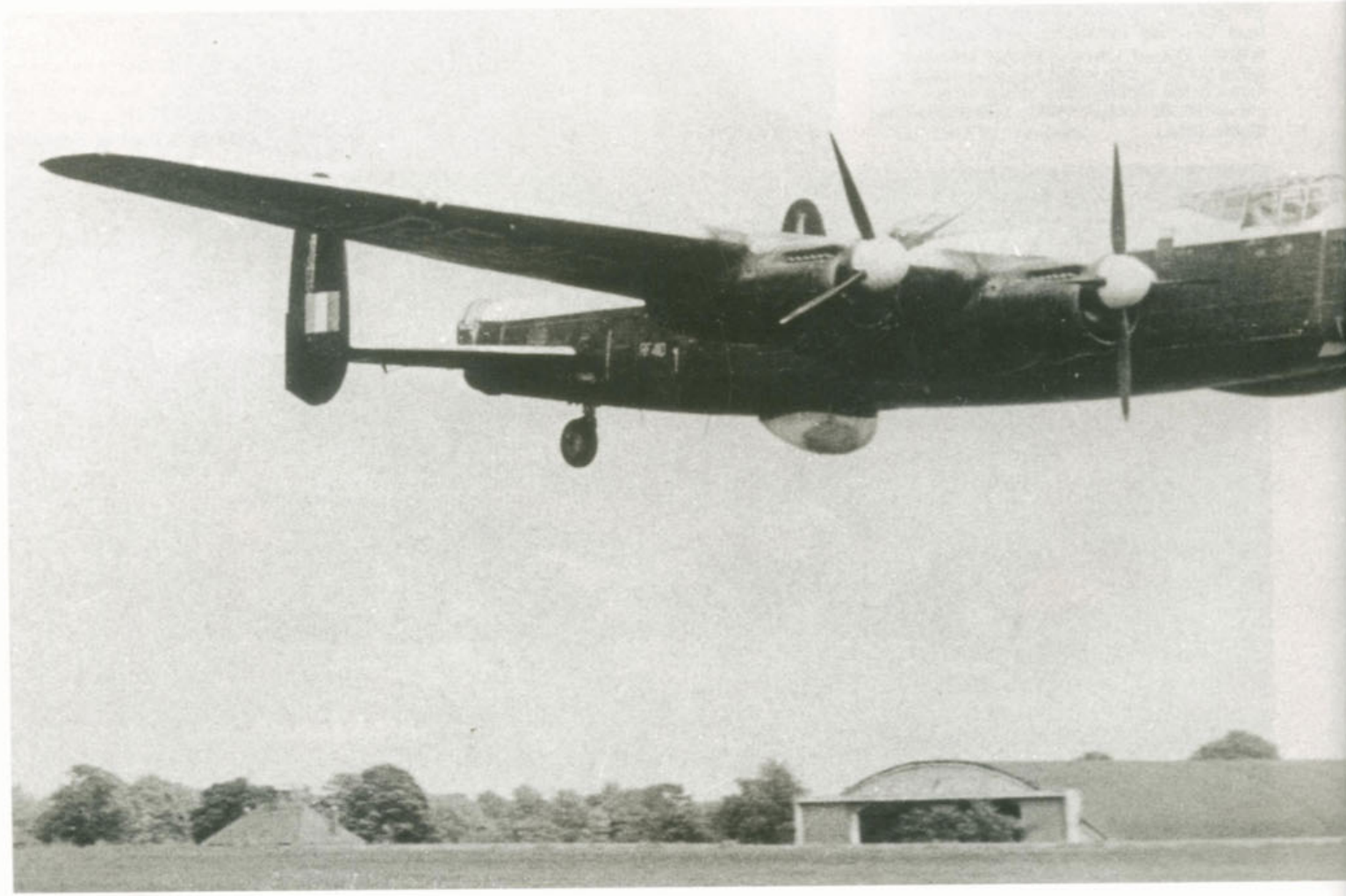
TRAINING AND CIVIL LINCOLNS

In December 1946 RE364 returned to Avro to be fitted with a faired nose and tail, a 250gal (1,137lit) fuel tank in the nose and three 500gal (2,273lit) tanks in the bomb bay to take capacity to 4,600gal (20,916lit), some bunks and seats and small windows in the aft fuselage and partial soundproofing; finish was natural metal. It joined the Empire Air Navigation School in February

Lincoln SX972 flew from December 1950 with Armstrong Siddeley Proteus turboprops in the outer nacelles. (Alan Hall)

1947 where it was named *Aries II* and through the rest of the year it flew to Singapore, South Africa, Canada and New Zealand before being written off in a refuelling fire on 26 January 1948 (*Aries I* was converted from Lancaster PD328).

RE367 replaced it and such was the rushed conversion, completed on 30 September and including RE364's faired nose, that its standard bomber camouflage was retained for a period. As *Aries III* it served with the RAF Flying College at Manby when the unit formed in July 1949 and with other standard Lincolns in natural metal made up No. 1 (Heavy) Squadron. Highlights were a record breaking flight from London to Khartoum on 20 October 1950 (14 hours 23 minutes for an average 213mph [343km/h]) and a 28 day 25,000 mile (40,225km) east-about Round-the-World flight through late October and November. A series of arctic



navigation exercises followed in July 1951 using Iceland as a base, and then trips to Ascension Island and Japan, before *Aries III* was withdrawn in September 1953 and replaced by *Aires IV*, a Canberra. The College's other Lincolns included RE414 *Mercury II* and RF523 *Thor II*, the previous holders of these names having been Lancasters or Halifaxes. The Flying College retained its Lincolns until 1960.

The Central Navigation and Control School was established in 1950 and used Lincolns from early 1952. Training flights could include long above-cloud trips at high altitude or eight hour flights over the sea at very low level without the autopilot. In addition, as part of simulated supply drops during training for Transport Command, very low level flights, down to as little as 150ft (45.7m), were also allowed over the British countryside. The unit's Lincolns were named after stars and were phased out in October 1955.

A few 'Lincolnian' civil conversions were made but, apart from Napier's ice trial aircraft, the only Lincoln to gain a British civil registration was RE290 as G-ALPF in May 1949. A Mk.II, it was used by Rolls-Royce from July 1945 for Merlin 68 development but, when withdrawn in January 1947, RE290 was officially regraded as a Mk.I. Hence, being non-standard, it became available for civil sale and was bought by

Below: How low can you get? A display of single engine flying given at RAF Aston Down by Flt. Lt. Trimble in B.Mk.2 RF410 of No. 187 Ferry Squadron. (Peter Green) Right:: Lincoln RF370 of No. 15 Squadron at RAF Wyton receives engine maintenance in October 1949. (Crown Copyright/MoD)

Avro Lincoln specification

Dimensions:

Span:	120ft (36.6m)
Tail Span:	33ft 9in (10.3m)
Length:	78ft 3.5in (23.9m)
Height (tail down):	17ft 3.5in (5.3m)

Wing Area: 1,421sq.ft (132.2sq.m)

Weights:

Tare:	44,188lb (20,044kg)
All-up-Weight:	82,000lb (37,195kg)

Powerplant:

B.Mk.1	Four 1,635hp (1,219kW) Rolls-Royce Merlin 85 or 85A
B.Mk.2	Four 1,315hp (981kW) Packard (US-built) Merlin 68 (68A retro-fitted)
Mk.30, 30A & 31	Alternative four 1,635hp (1,219kW) Rolls-Royce Merlin 85B, two Merlin 85B and two 1,315hp (981kW) Merlin 66, or four 1,650hp (1,230kW) CAC (Australian-built) Merlin 102 (rating is for take-off; 85/85A rating at 5,000ft [1,524m] = 1,705hp [1,271kW])

Performance:

Maximum Speed:	B.Mk.1 310mph (499km/h) at 18,300ft (5,578m) and 69,500lb (31,525kg) B.Mk.2 290mph (467km/h) at 20,000ft (6,096m)
Diving Speed:	B.Mk.1 350mph (563km/h)
Time to 20,000ft:	B.Mk.1 (at 65,000lb [29,484kg]) 26.5 minutes
Sea Level Rate of Climb:	820ft/min (250m/min) at 82,000lb, 1,125ft/min (343m/min) at 69,500lb
Service Ceiling:	B.Mk.1 (at 82,000lb) c28,000ft (8,534m) B.Mk.2 (Merlin 68A) c32,000ft (9,754m) B.Mk.30 c27,000ft (8,230m)
Maximum Range	(full bomb load):B.Mk.1 2,800 miles (4,505km)

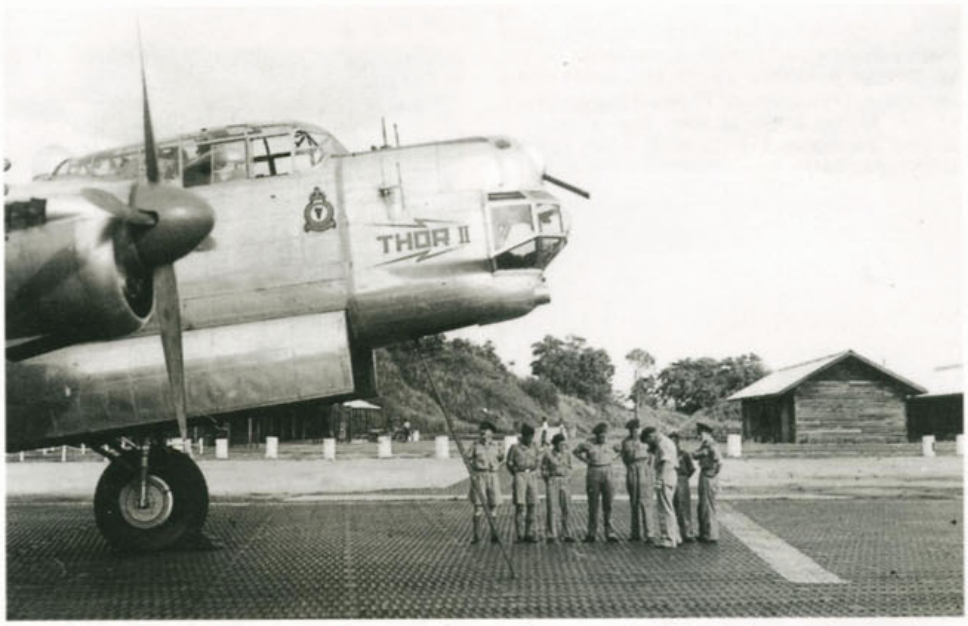
Armament:

Twin 0.5in (12.7mm) Browning machine-guns in nose and tail turrets, two 20mm Hispano cannon in dorsal turret. Maximum possible bomb load 22,000lb (9,979kg); typical loads include 1 x 4,000lb (1,814kg) or 2,000lb (907kg) plus 14 incendiaries, 15 x 1,000lb (454kg), 12 x 1,000lb plus 8 x 500lb (227kg), 6 x 2,000lb, 1 x 8,000lb (3,629kg) plus 8 x 500lb or six A.Mk.VI mines.

Unpainted Lincoln B.Mk.2 RF523 was named *Thor II* when it joined the RAF Flying College at Manby. It is seen here dropping 500lb bombs probably over the Wainfleet range off the north Yorkshire coast. (MoD)

Airflight Ltd, Langley, who converted it into a Lincolnian freighter with a long ventral pannier. Surrey Flying Services made 46 trips with it in June and July 1949 to transport diesel fuel during the later stages of the Berlin Airlift (the pannier was not suited to dry cargo). It then went to Airtech Ltd in August, Fairtravel Ltd in August 1951 and Fairflight Ltd in December 1952, but the registration was cancelled the following October and the aircraft scrapped.

In 1957 three Lincolns in store at Langer after the cancelled drone programme, RE376, RF417 and RF458, were acquired by a South American air charter firm to move fresh meat from Paraguay to Peru. Field Aircraft Services, Tollerton, were asked to do the conversions. RE376 was the first to arrive, on 28 July, and they were intended to receive the most extensive conversions given to any Lincoln. The bomb doors were removed and the side fuselage ribs extended downwards to form a large hold stretching from the rounded nose until it faired into the original fuselage ahead of the tail. The hold was insulated with double-skinning and 125 quarters of beef would hang on rails fitted to the bomb bay roof. Respective civil registrations were ZP-CBR-97, ZP-CBG-96 and ZP-CBS-98, but only the first was completed and it never flew in its new guise. The necessary clearance from Avro to cover the new structure's stressing was never given so a certificate of airworthiness was not awarded and the Ministry banned any flying. Nothing was done to RF458 before work was halted and in September 1959 they were all sold for scrap.



Above: Close up of *Thor II's* nose art taken at Changi, Singapore, in 1948 with the crew in attendance. The aircraft did a number of long range overseas flights for both experience and for instructing aircrew of other countries in the bombing techniques developed at the College (Bill Harrison) Below: Lincoln RE364 joined the Empire Air Navigation School in February 1947 where it was named *Aries II* and flew many long distance flights. (Eric Myall)

Right: In about 1962 modified Lincoln B.Mk.2 RF505 is seen serving with RAF Signals Command late in its career as 'K' of No. 151 Squadron. Note the small serial letters and numbers and the additional radome beneath the nose. (MAP) Lower right: Natural-metal finish Mk.2 RF484 as DF:A of the Central Bomber Establishment in the late 1940s.

WIND DOWN

By the mid-50s fighter affiliation exercises included work with Hunter jets which indicated how out of date the bomber had become. Lincolns would most probably have been phased out earlier if, as planned, the replacement jet bombers been more plentiful and there had been less overseas action. By 1955 the only home units still operating Lincolns were squadrons engaged on special duties or various training centres specialising in bombing, navigation or gunnery. When taken out of the front line many still had plenty of life left in them so they were further employed either as test beds or by RAF experimental units.

The last Bomber Command station to operate Lincolns was Hemswell, the base for Nos. 83 and 97 Flare Force Squadrons. In January 1956 these units were renamed Antler and Arrow Squadrons respectively and formed the Bomber Command Bombing School's Attack Wing for H2S radar training, but both disbanded later in the year. In April 1952 No. 199 Squadron, specialist in radio and electronic countermeasures (RCM/ECM) training, also arrived at Hemswell with Mk.2s and Mosquito NF.Mk.36s. The unit's ability to black out entire radar networks became so good that exercises would be abandoned once its was realised No. 199 was around. On one occasion all the southern radar defences, and London Airport, were blotted out during an exercise against a fighter control station. At Hemswell No. 199 became No. 1 Group's specialist countermeasures unit and standard kit for its Lincoln's included a full mix of jammers and fixers plus two chutes for dropping Window.

The squadron's main duty was the practice jamming of UK fighter control centres but it would also detach to the Mediterranean and North Africa and undertake similar work for other countries such as Norway and Germany. During bomber exercises it was very effective in supplying countermeasures for the Marker and Main Force Squadrons. In March 1956 the first Canberras joined No. 199 to replace the Mosquitoes and they worked alongside the Lincolns until the latter passed to No. 1321 Flight on 1 October 1957, when the jets and the rest of the squadron were moved to Honington. The Lincoln possessed neither the height nor the speed to work with the V-bombers and the Canberra took over the RCM/ECM training role. No. 1321 embraced the surviving elements of Nos. 83 and 97 Marker Squadrons, and No. 199, and continued its specialist work until 31 March 1958. The small

Upper right: Lincoln RF538:17 of the Empire Test Pilot's School shortly after the unit had moved from Cranfield to Farnborough in 1947. (Alan Hall) Right: Lincoln RE376 rebuilt as Peruvian meat freighter ZP-CBR-97 in 1958-59. It never flew in this form. (Eric Myall)

Lincoln RE311 as '48' of Central Signals Establishment at Watton in about 1950 to 1952. Seen at the Odiham Coronation Review of the Royal Air Force (APN)

Lincoln Conversion Flight also left Hemswell on 2 April 1958.

The final Bomber Command unit to use Lincolns was the Bomber Command Bombing School (BCBS) at Lindholme who kept the type until October 1960. The last Battle of Britain displays held at Lindholme took place in 1958 and 1959 and the crowds were treated to Lincolns flying with four, three, two and finally one engine. WD143 was the last Lincoln to serve with Bomber Command, departing on 6 October when it flew to No. 23 MU at Aldergrove. However, the Central Signals Establishment, part of No. 90 (Signals) Group, kept the type going until 1963. Based at Watton, this unit used Lincolns for the initial development of new electronic apparatus, including RCM, ECM, ASV radars, navigation equipment and blind landing aids. Some Lincolns were delivered new and spent their entire operational career at Watton and CSE used the type between 21 August 1946 (when RE395 joined) and 19 April 1963 (when RA685 left).

The Lincoln replaced the Lancasters of CSE's Calibration Squadron and, early on, helped to redevelop the British early warning radar chain which had been run down after 1945; the start of the Korean War made this an urgent requirement. The unit eventually split into two, Calibration N Squadron (navigation) and Calibration R Squadron (radar), and these became Nos. 116 and 527 Squadrons in August 1952. No. 527 became the largest squadron in the RAF with three flights of at least ten aircraft:- A Flight with radar calibration Lincolns, B Flight with Ansons and then Varsities, and C Flight with Mosquitoes, which were later replaced by Meteor NF.Mk.11 and Mk.14s.

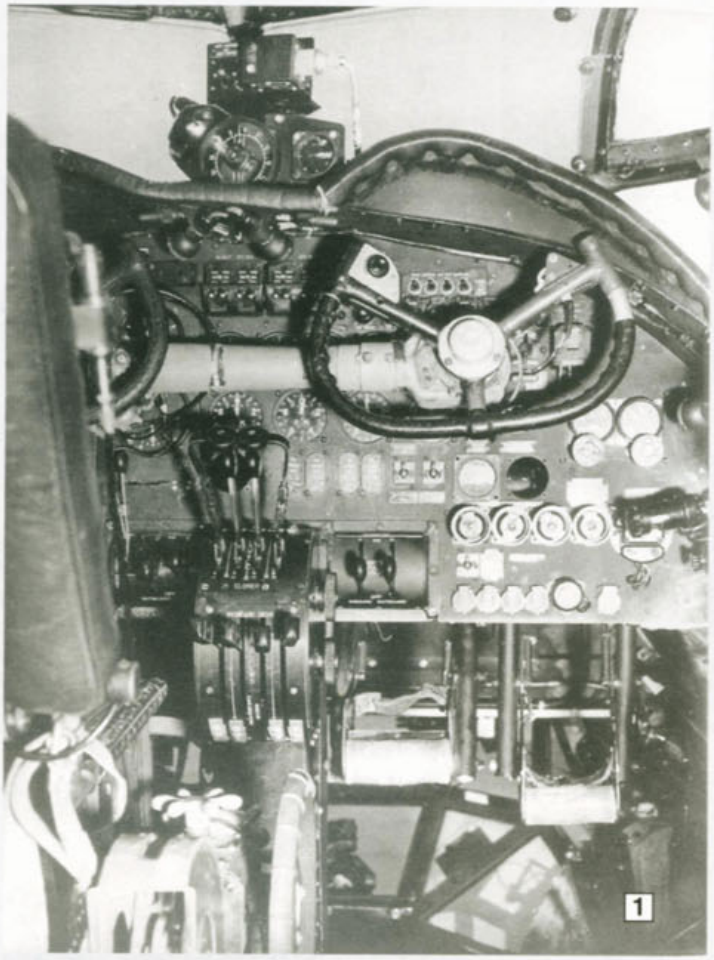
In October 1956 these units were regrouped as B Flight Development Squadron (A Flight using Canberras) working almost entirely with RCM/ECM jamming, sensing equipment and listening apparatus until the Lincolns were retired. An example was 'Indigo Bracket', a late 1950s L, S and X-band centimetric jamming system, which used such high voltages that early flying was limited to 500ft (152m) to prevent arcing. When cleared for operation at 15,000ft (4,572m), it could black out all of Britain's east coast radar chain. The Lincolns would fly at low level until they were at the radar horizon about 200 miles (322km) off shore and then switch on the apparatus at full power as they began to climb; this reduced the radar's effectiveness so badly that the V-Force could fly past undetected.

The unit worked with other RAF Commands, the Royal Navy, the Army's anti-aircraft radar units, and overseas in the Mediterranean, Middle and Far East. To assist jamming operations, huge volumes of window were dropped through a dispenser mounted in the rear fuselage behind the flare chute. CSE's Development Flight became No. 151 Squadron in January 1962 as the last RAF unit to operate the Lincoln. Some machines received comprehensive refurbishing by an Avro working party during 1959 but by 1962 spares were in short supply and cannibalisation of withdrawn airframes became widespread in order to keep the last half dozen aeroplanes airworthy. In August five aircraft took part in a major exercise with the Royal Navy to search for US Navy warships in the Bay of Biscay.

The Lincoln's last Battle of Britain display came in September 1962 when No. 151's RF505 performed at Biggin Hill. Final withdrawal from Watton came at the end of March 1963. On 30 April, RF398 flew to Henlow to be preserved (today it stands in the RAF Museum at Cosford) and the last RAF Lincoln flight was made by RF461 when it flew from Shawbury to Aldergrove on 18 June 1963. However, the College of Aeronautics at Cranfield had granted G-APRJ (ex-RF342) a new lease of life when it

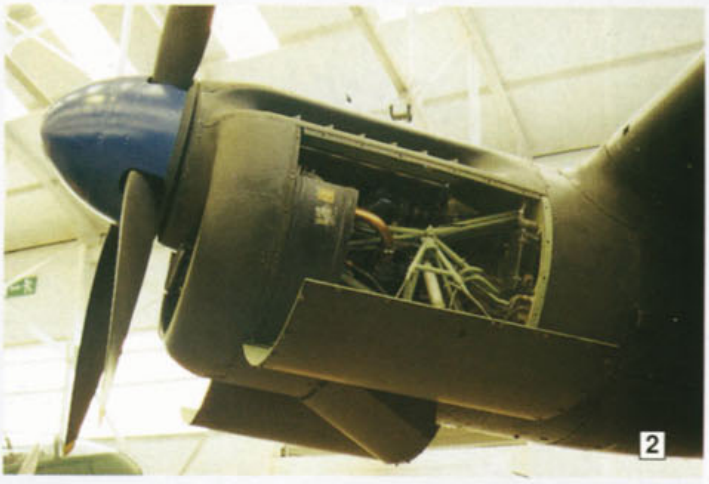
Continued on page 40

While serving with RAE, Lincoln Mk.2 WD125 was painted red overall and is here seen at West Malling in about 1955. (Peter Green)



Lincoln in detail

Lincoln RF398 at the RAF Museum, Cosford



1. The cockpit interior showing dual control columns and rudder bars with a view looking through the bomb aimer's position. 2 and 3. Left and right hand close ups of the Merlin engines with the cowlings partly open.

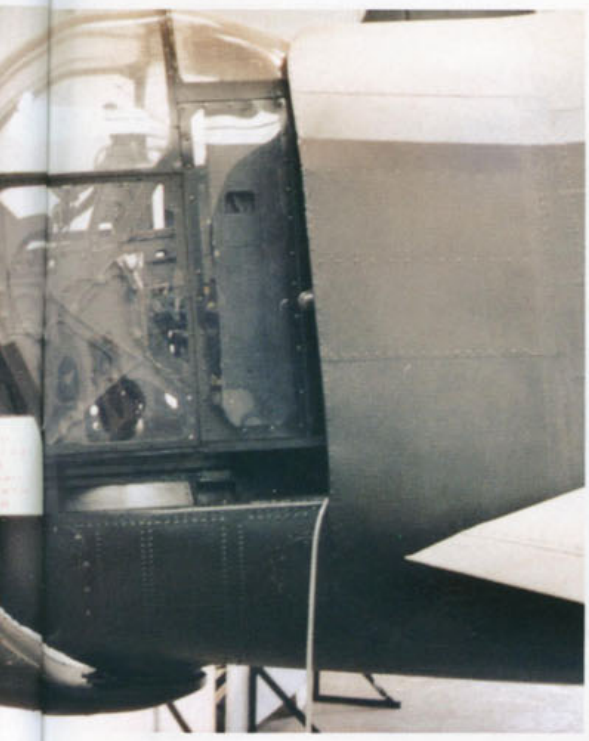
4. The main undercarriage which differed from that of the Lancaster. All main legs are in gloss black with the exception of the two retraction jacks in red and the lower part of the oleo leg in natural metal. Undercarriage locking pins are in position shown by the red tabs.

5. Looking directly under the nose of the bomb aiming position with optical flat panels and a seat for the bomb aimer as opposed to the Lancaster's prone position. 6. The starboard side of the fuselage showing the propeller feathered and the bomb doors open. Spinners were in blue and standard yellow tips appeared on the propellers. 7. Another view of the port side of the nose giving the placing of the pitot head on the mid-fuselage line and covered by a red warning tab.

Lincoln in detail

Pictures taken by Tony Buttler of Lincoln Mk.2 RF398 on display at the RAF Museum, Cosford

8. The Lincoln was the first British bomber to have .5 calibre machine guns as standard rear armament although some Lancasters were fitted with them late in the war. The large bulge below the turret, which rotated with the turret as it turned, was a rearward looking radar which also assisted in gun laying and tracking. 9. The Lincoln's H2S scanner was used for both navigation and bombing accuracy. Two different types were fitted for either the Mk. 3G of 4A radars both of which had different sized housings.



10. A useful view of the rear fuselage showing the differences in the Lincoln's tail fin compared to those of the Lancaster. The former had increased area and much larger trim tabs. Crew entrance, outlined in yellow, was also in the rear fuselage. The tail wheel did not retract. 11 and 12. Two views of the forward fuselarge taken fom port and starboard. The framing of the cockpit can be clearly seen and the armour plating behind the pilot's seat is also visible. All fuselage and wing stencil markings were in yellow.

Above: Prototype PW932 put out to grass at Cranfield during the second half of the 1950s. Note the open bomb doors, wing tips and spinners removed. PW932 was scrapped here in 1960. (Alan Hall collection) Below: The end of the line; Lincoln fuselages awaiting scrapping at a Maintenance Unit. (APN)

Continued from page 36

used the aircraft for laminar flow aerofoil research. It was released for disposal in July 1966 and the last Lincoln flight made in Britain came on 9 May 1967 when G-APRJ left Cranfield for Southend to join a private museum; the main parts of it are currently stored at Sandtoft.

FLYING QUALITIES

Some pilots felt the Lincoln was relatively easy to fly and, in certain respects, particularly light on the controls, but rapid changes of altitude in bank needed a lot of strength and effort from the pilot. The type was very good at many aerobatic manoeuvres including rolls when banking at steep angles. However, others remember Lincolns as noisy and extremely uncomfortable to fly, so feelings for the aircraft appear mixed. High level flying always seems to have been made in extreme cold while low level flight in the tropics would roast the crew. Lacking a pressure cabin, air conditioning or good heating, Lincoln crews had to depend on finding enough clothing to keep warm or getting enough ventilating air through the aircraft to keep cool, dependent on where they were flying.

Eric Myall, former Lincoln Type engineer, remembers the aircraft as pleasant enough to fly but it was slow and always seemed to do everything, such as climb and cruise, at 145 knots (269km/h). By the time he joined a Lincoln unit the powerplant was performing well but the aircraft was heavy and needed a strong pilot to haul it around the sky; small pilots had to work hard to keep control. Formation flying in heat was very hard work and during preparations for the 1953 Coronation flypast the pilots were each losing 3lb (1.36kg) in sweat during a practice trip. In affiliation exercises with Meteors and Vampires, Lincoln pilots would practice corkscrewing to avoid the fighters but entering a dive and corkscrewing was again hard work; on one occasion Eric's Lincoln had to fire Very lights at a Meteor who had come too close to its tail. The corkscrew manoeuvre was officially discontinued as a fighter evasion tactic in 1953 because the airframes were showing their age and jet fighters demanded such violent evasion that some fuselages had become twisted.

A Lincoln characteristic was its hissing and squealing brakes, much noisier than a Lancaster's, which, along with revving Merlins, made for an odd sound when taxying around tight corners. The wings were so long they would waggle up and down rather more than a Lancaster's, something that could be unnerving to a new crewman. Alan Hall remembers his first flight as a Signaller in a Lincoln and his amazement at seeing the wing tip flex up and down by at least six feet, much to the amusement of the rest of the crew.

RAAF Lincolns with Merlin 102s lacked shrouded exhausts which made them much noisier than other marks. Flying the long nose Mk.31 differed little to standard Lincolns except the extra side area made landings more difficult in crosswinds and also affected forward vision at night; flown skilfully it could even outmanoeuvre a piston fighter. Flying the aircraft below 100ft (30.5m) on just two engines actually increased top speed by about 10mph (16km/h) while also cutting the load on the engines, the cause was a fall in induced drag.

The Avro Lincoln was the RAF's last piston-engined bomber. It is something of an unsung hero and, despite being out of date, racked up an impressive record of action and service, especially overseas, while also proving to be a fine test platform for engines and other equipment.

Avro Lincoln kits and accessories

Scale	Type	Manufacturer	Reference	Remarks
1:72	Lincoln B.2	Sanger	CON 730	Resin kit
1:72	Lincoln	Last of Line	DB2003	Resin conversion kit
1:72	Lincoln	DB Productions	DB2004	4-blade propeller
1:72	Lincoln	DB Resins	DB35	Nose and wing tips
1:72	Lincoln	Paragon Designs	PAR72051	Complete kit
1:72	Lincoln MR.31	Paragon Designs	PAR72052	RAAF nose conversion
1:48	Lincoln B.2	Paragon Designs	PAR48057	Resin conversion kit
1:48	Lincoln MR.31	Paragon Designs	PAR48118	RAAF nose conversion
1:48	Lincoln	Paragon Designs	PAR48119	Saddle type radome

Avro Lincoln B.Mk.II RF525 named *Thor II* of the Empire Air Armaments School, RAF Manby in April 1947.

Avro Lincoln B.Mk.II RF440:NF-X of No. 138 Squadron based at RAF Wyton in 1948

Avro Lincoln B.Mk.II RF386:DX-N of No. 57 Squadron based at RAF Waddington but on detachment to RAF Tengah, Singapore in March 1950. Spinners were probably yellow. The squadron badge is shown in the pre-war 'grenade' outline.

No.57 Squadron badge

Avro Lincoln B.Mk.II RF403 used to test the Python turboprop engine later used in the Westland Wyvern. The aircraft later served with the Ballistics Trial Flight of the Armament & Instrument Experimental Flight.

Avro Lincoln Mk.30 A73-2 named *Nyhuan* of the School of Air Navigation, RAAF East Sale in January 1952.

Avro Lincoln B.Mk.II B-017 of the Grupo de Bombardes, V Brigada Aerea, Comoradora Rividavia, Argentine Air Force in April 1963.

Above: Preserved Argentine Lincoln B-010 (actually B-004) at the National Aeronautical Museum, Buenos Aires, in April 1968. (Alex Reinhard, via Air-Britain Colour Archive) Below: No. 151 Squadron's Lincoln Mk.2 RF685:M at Henlow in August 1963. (Jim Halley, via Air-Britain Colour Archive) Bottom: A Bomber Command Bombing School Lincoln, RF398, at RAF Lindholme in 1960. (Tim Mason, via Air-Britain Colour Archive)

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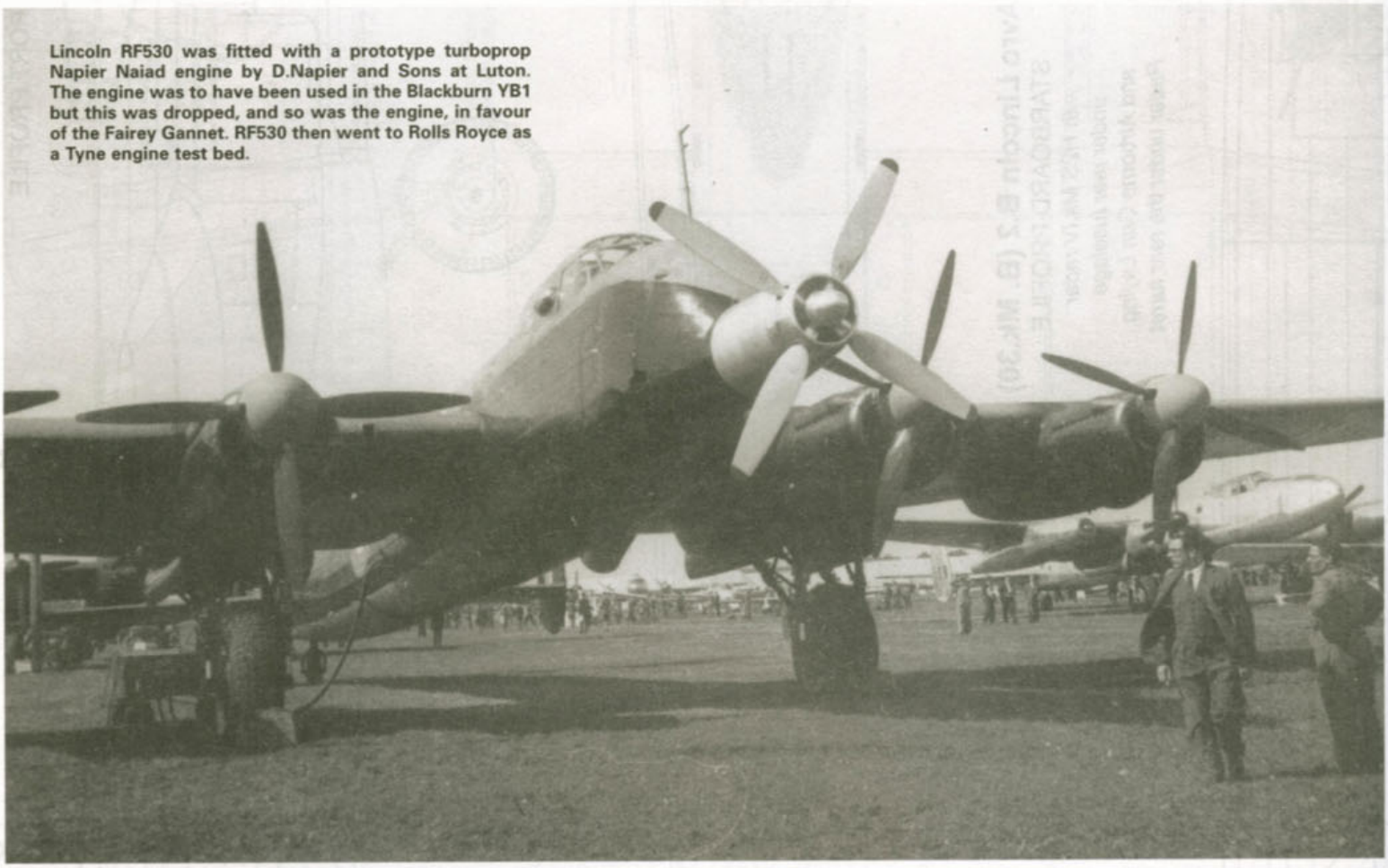
Lincoln Mk.2 RE418 was used by Avros, A&AEE and by Bristol Aircraft before being struck off charge in February 1953. (W.A.Harrison)

Avro Lincoln in pictures

Three Lincolns of No. 61 Squadron which were in Malaya from 1954 to 1964.



Lincoln RF530 was fitted with a prototype turboprop Napier Naiad engine by D.Napier and Sons at Luton. The engine was to have been used in the Blackburn YB1 but this was dropped, and so was the engine, in favour of the Fairey Gannet. RF530 then went to Rolls Royce as a Tyne engine test bed.

Lincoln B.Mk.2 RF344 PH:M of No. 12 Squadron was based at RAF Binbrook where it was fitted with the large size cupola of the Mk.4 H2S. It was involved in an accident at Binbrook on 12 December 1950 when attempting a three-engined overshoot and was written off.

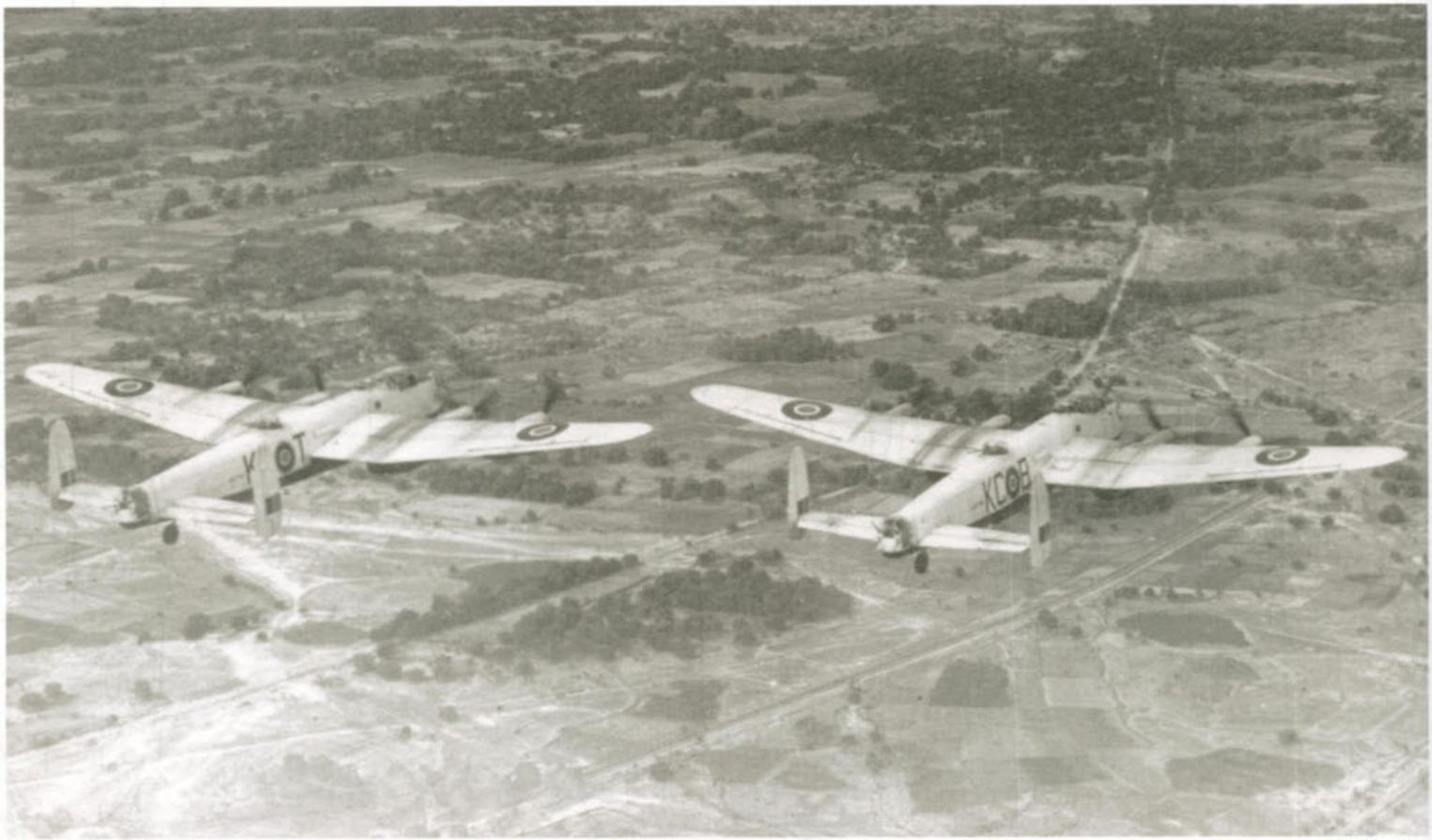
Seen at the College of Aeronautics (now Cranfield University) this Lincoln, ex-RF342 then civil registered as G-APRJ, was used for many experimental purposes including the testing of different wing shapes as seen on the fuselage under the cockpit.

A Lincoln B.Mk.2 of No. 44 (Rhodesia) Squadron coded KM:K when operating from RAF Wyton where it was one of the original Lincoln trials squadrons. Their Lincolns were replaced by B-29 Washingtons in January 1951.

LINCOLN PRANGS

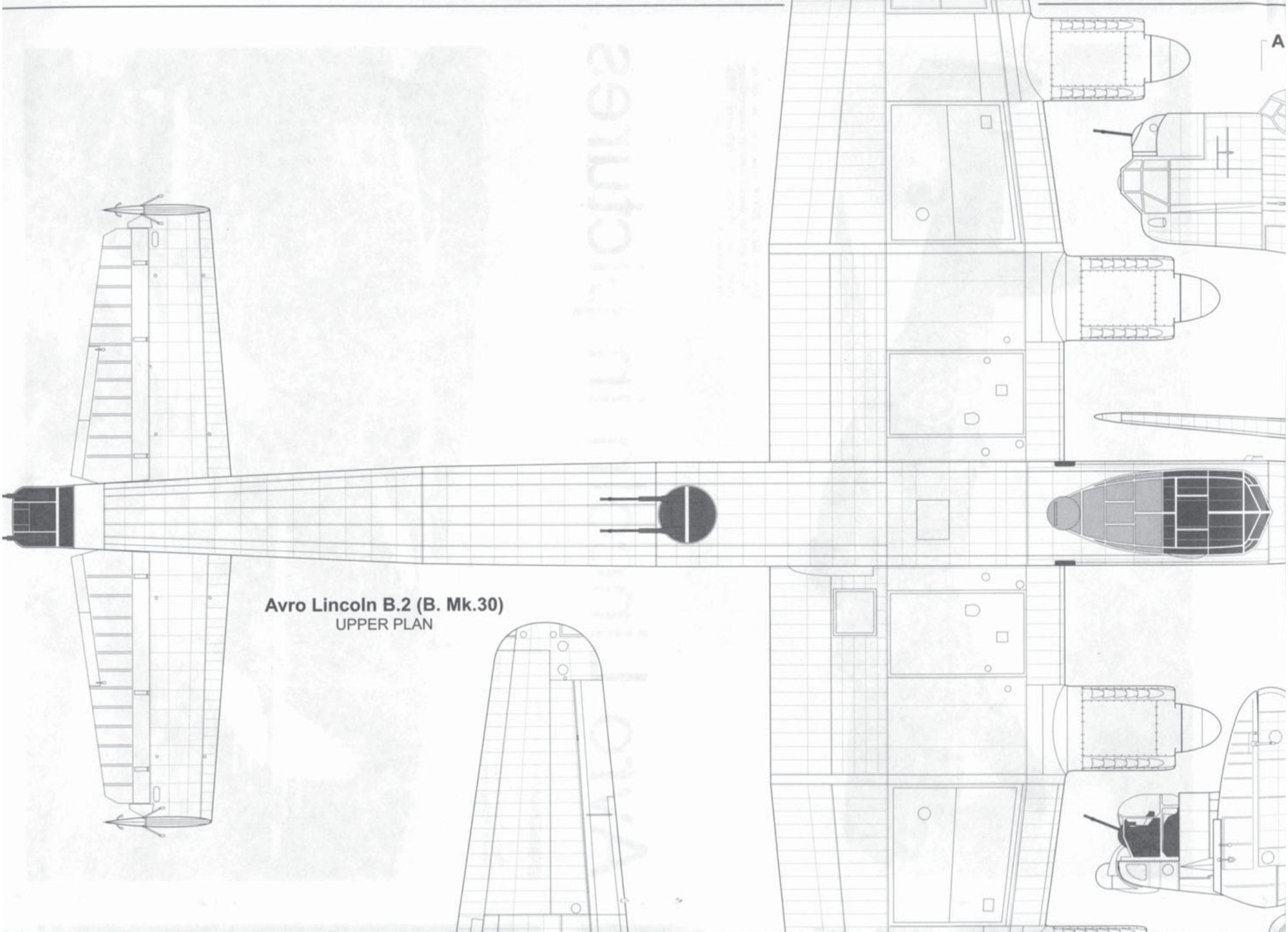
Left and above: On 28 September 1956, after bouncing in turbulent conditions, No. 199 Squadron's RA657 overshot the runway at Turnhouse and came to rest in a ditch. It was declared Cat.5 and appears to have been scrapped on site. Note the blue and white striped spinners. This aircraft had served with Flight Refuelling in 1950 and 1951 where it refuelled F-84 fighters and No. 245 Squadron's Meteors.

Below: Lincolns were not prone to ground looping but this one obvious did. It has not been possible to establish the unit to which RA673 belonged. Obviously the crew got out unharmed if a little shaken by their unexpected arrival. (APN)

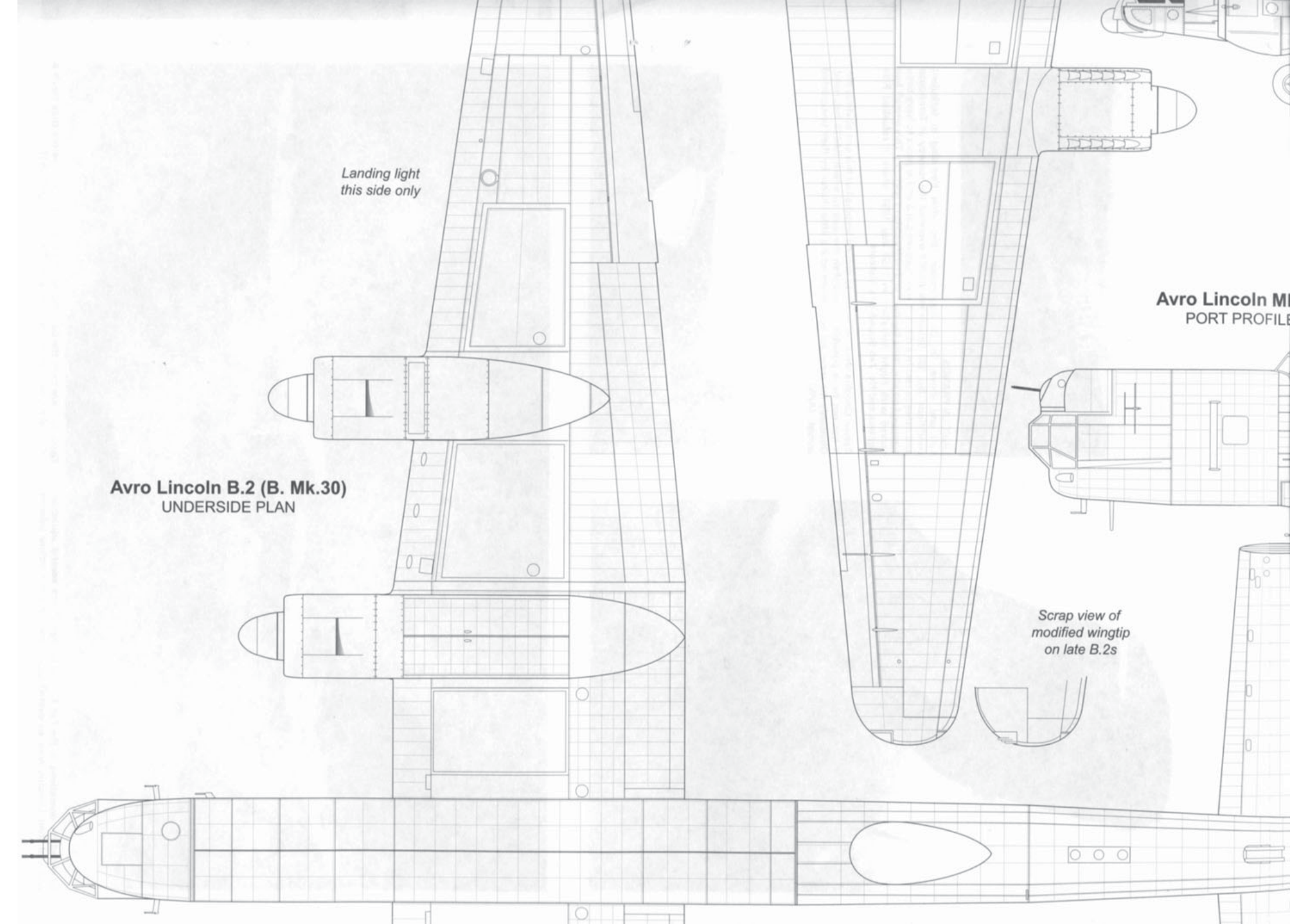


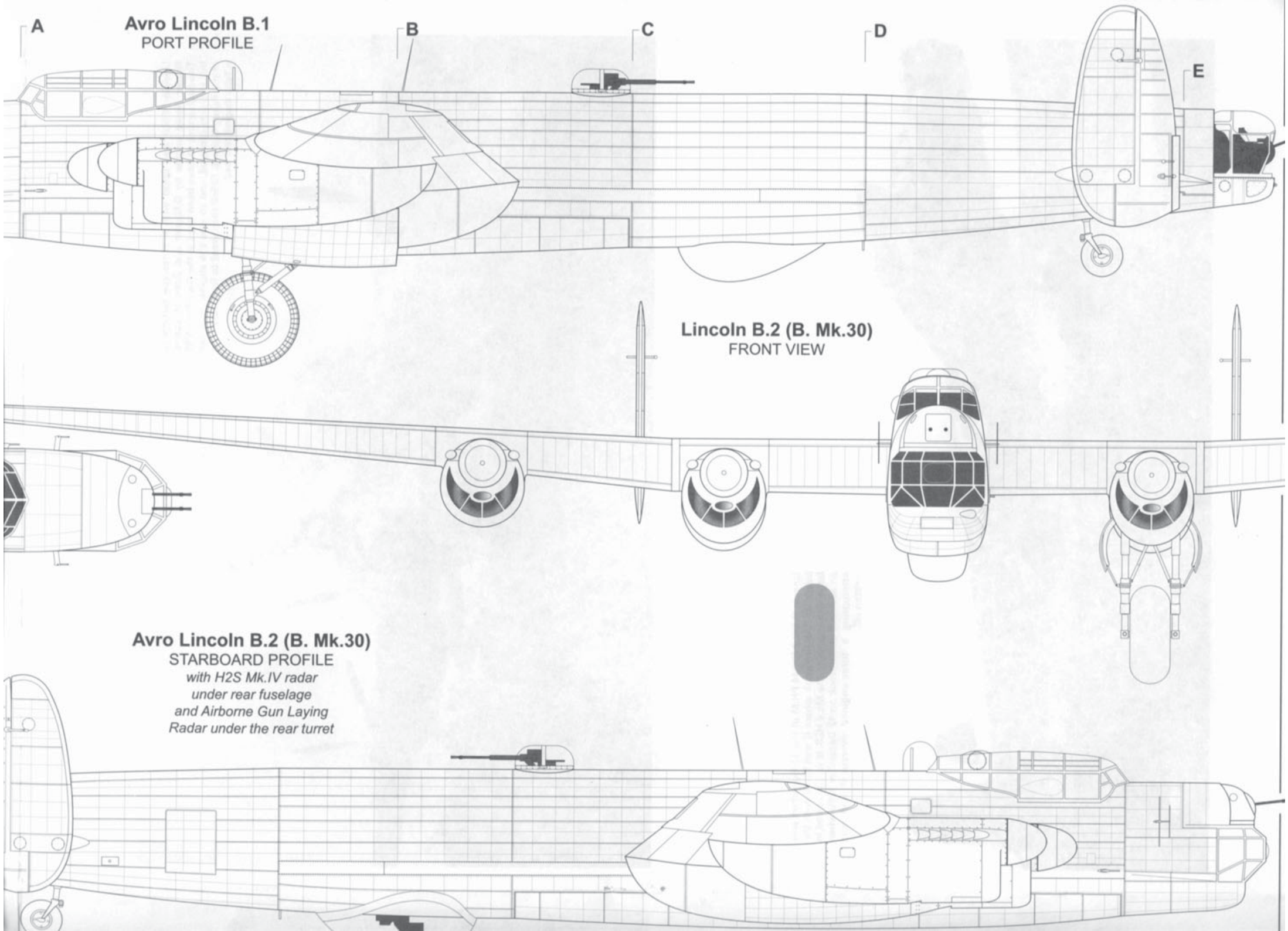
Intended for operations in the Far East with Tiger Force several squadrons received their Lincolns with an overall upper surface white colour scheme.

These two are from the Dam Busters squadron, No. 617, before they made a visit to the United States on a goodwill flight in August 1947.



Avro Lincoln B.2 (B. Mk.30)
UPPER PLAN


Landing light
this side only
Avro Lincoln B.2 (B. Mk.30)
UNDERSIDE PLAN
Avro Lincoln MI
PORT PROFILE
Scrap view of
modified wingtip
on late B.2s

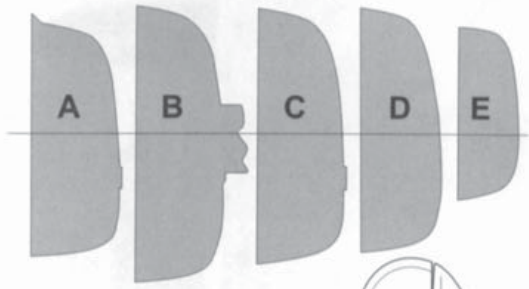


Avro Lincoln B.1
PORT PROFILE

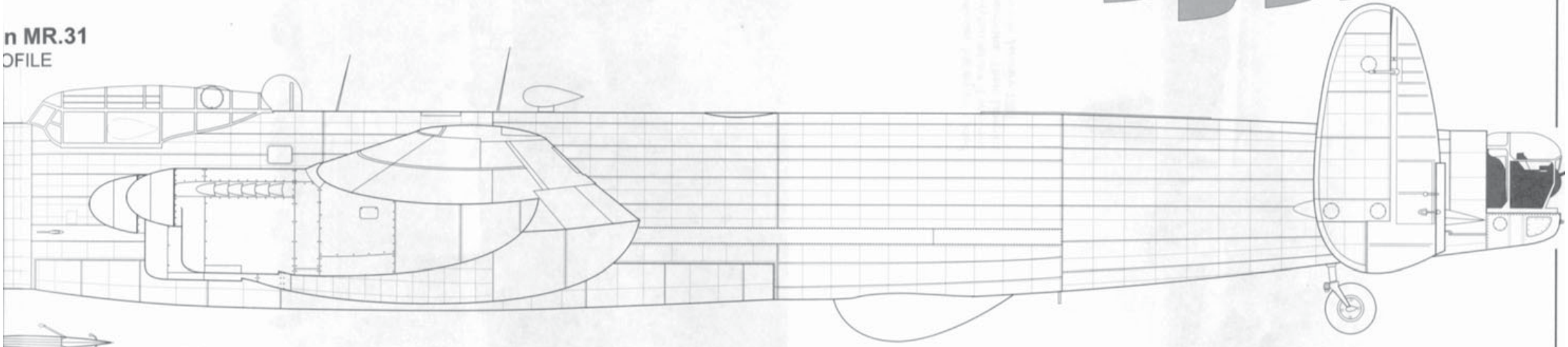
Lincoln B.2 (B. Mk.30)
FRONT VIEW

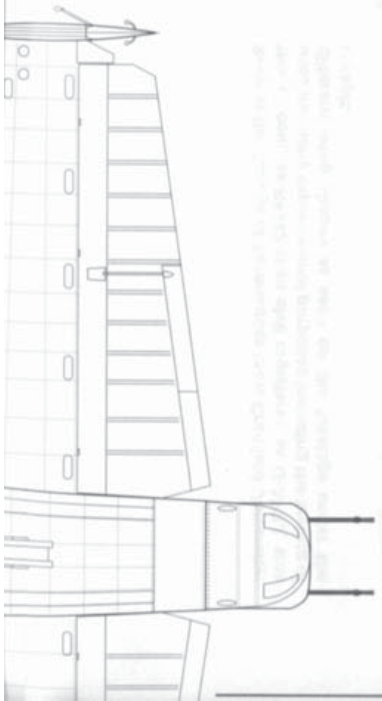
Avro Lincoln B.2 (B. Mk.30)
STARBOARD PROFILE
with H2S Mk.IV radar
under rear fuselage
and Airborne Gun Laying
Radar under the rear turret

Avro Lincoln B.2
FUSELAGE
CROSS-SECTIONS



n MR.31
OFILE





1:72nd SCALE
Feet
Metres

Drawings by Richard Caruana