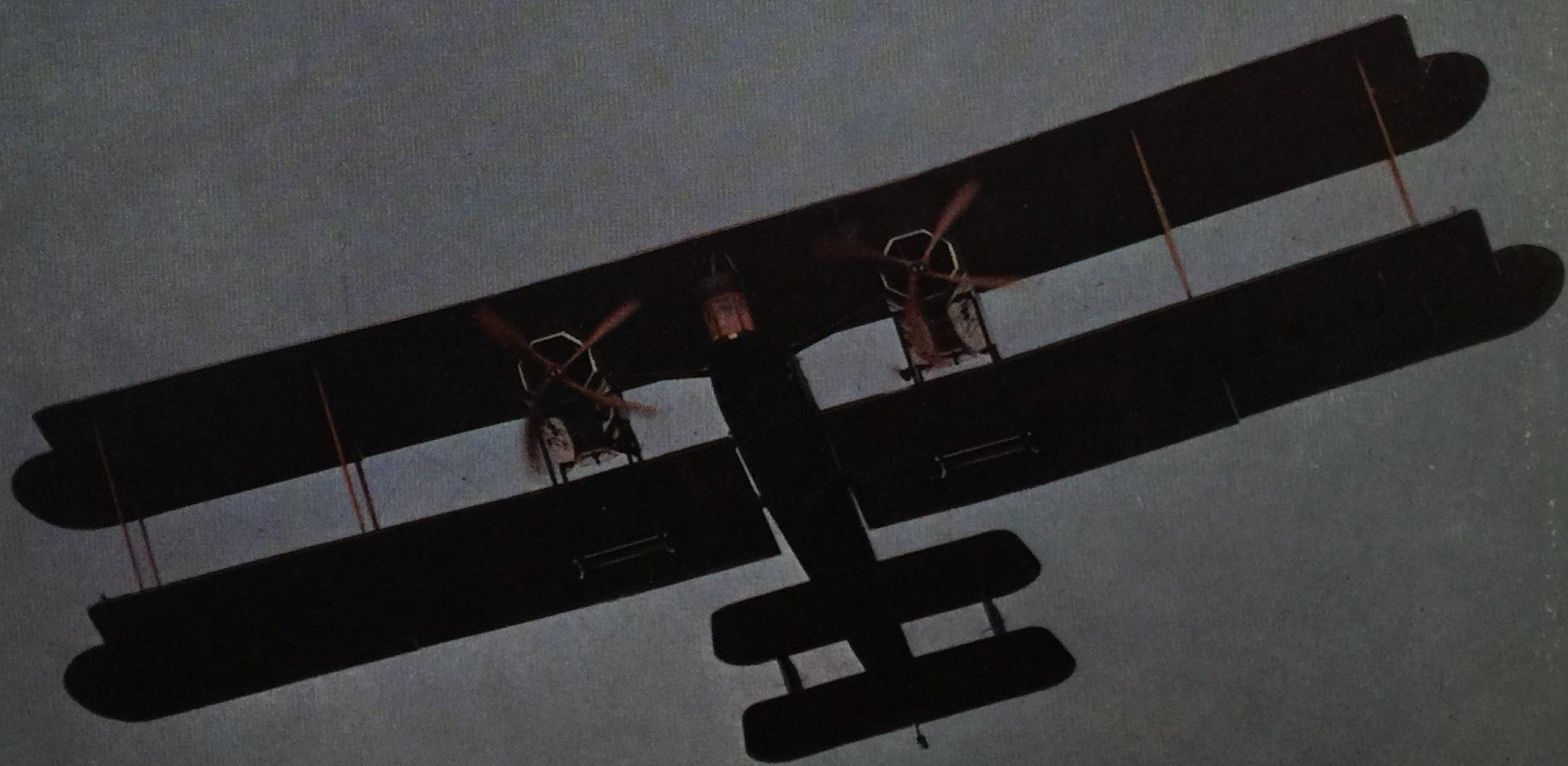


# technical notes

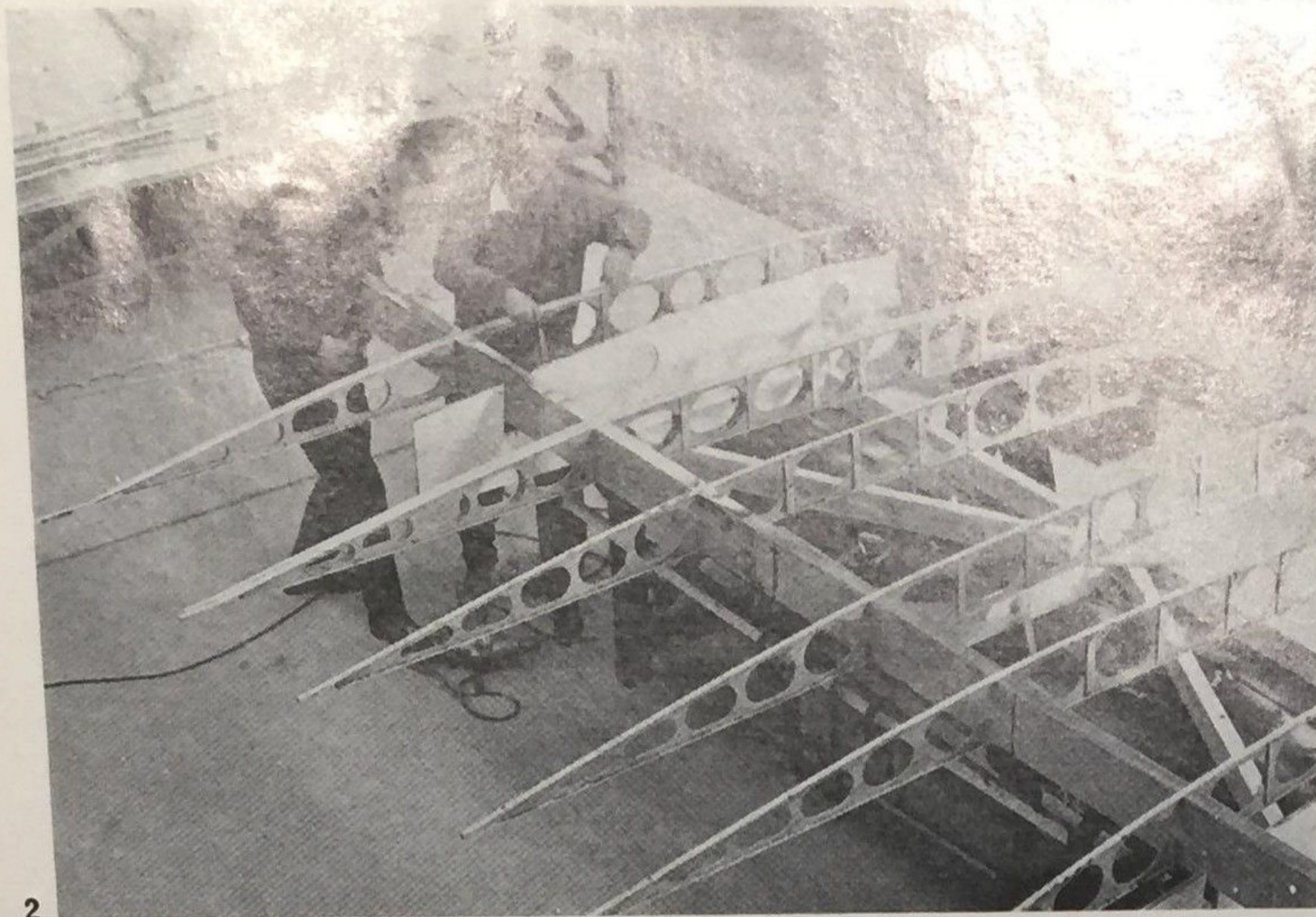
Aerodux in the form of  
Vickers Vimy

C I B A

May 1970



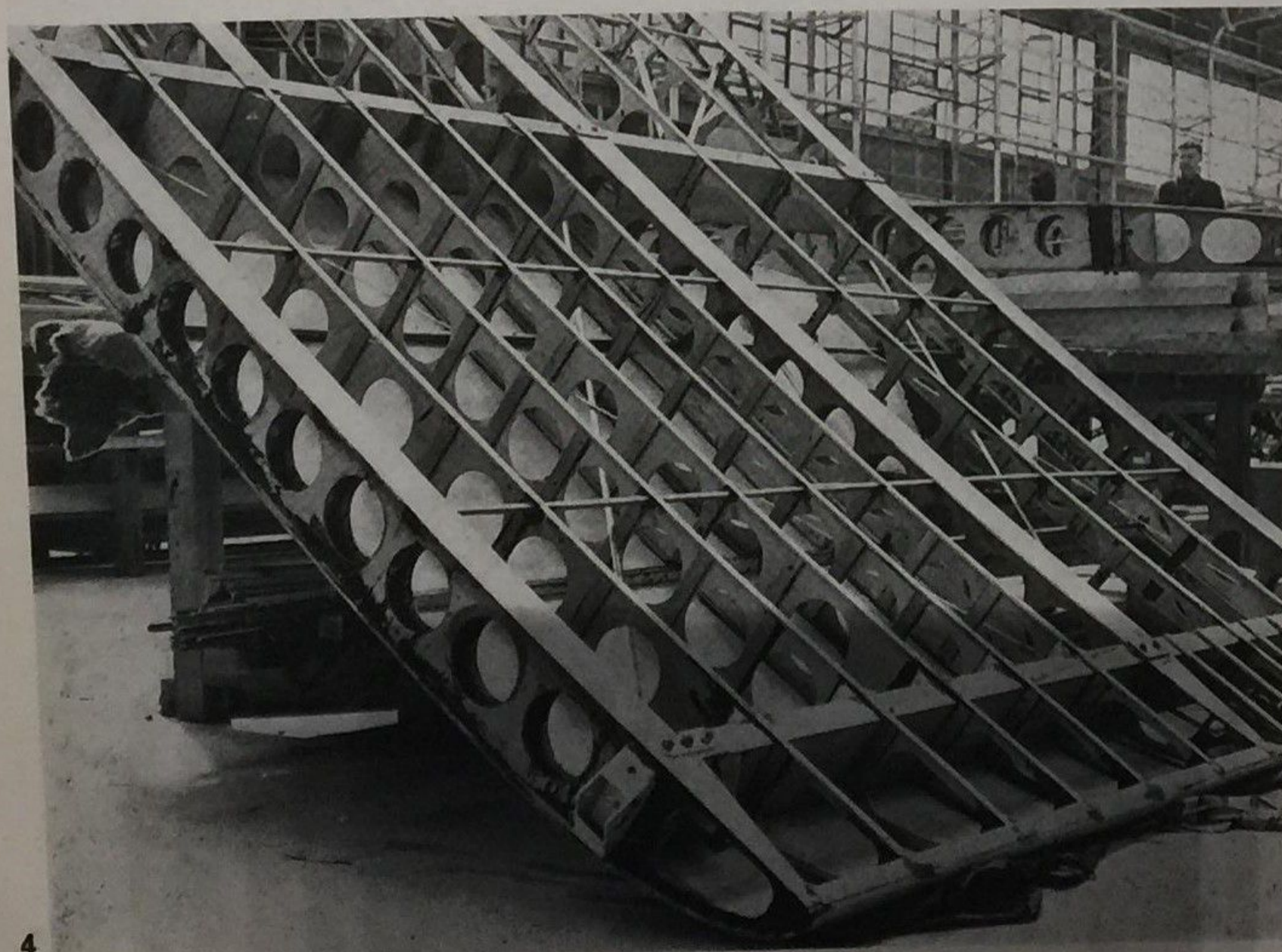




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### First transatlantic flight

It was the thirteenth airframe from the post-war production line at Weybridge that was selected as the transatlantic Vimy. All military equipment was removed and fuel capacity increased from 516 to 865 gallons to give a nominal range of 2,440 miles.

There were several challengers for the honour of being the first to make the crossing, for which the Daily Mail offered a prize of £10,000.

Alcock and Brown were the third pair to make the attempt; Hawker and Mackenzie-Grieve had made a forced landing in mid-ocean and Raynham and Morgan had crashed on take-off; the Alcock and Brown flight might also easily have ended in disaster. Cloud and mist obscured the sun for hours after take-off, preventing Brown, the navigator, from making checks on their position. After darkness fell, clouds obscured the stars. A generator failure made the radio useless.

When two-thirds of the distance had been covered, the Vimy entered a thunderstorm and was tossed about violently in a steep descent. Alcock regained control only 60 ft above the waves. After a climb to 11,000 ft and with a view of the sun at last, Brown fixed their position as 80 miles from Ireland, but with the controls freezing and the engine radiators blocked by snow and ice, an immediate descent to warmer air was necessary. They continued their flight 200 ft above the sea and crossed the coast of Ireland at Clifden, County Galway.

The flight had taken 16 hrs and 28 min. The coast-to-coast distance of 1890 miles was covered in 15 hrs 57 min at an average speed of 112 mph.

2 Aerodux-glued frames being threaded on the spars to form the main planes

3 Bonding on the top capping strip of the inner compression rib

4 Underneath view of starboard lower inner plane, showing attachment points for joining to fuselage



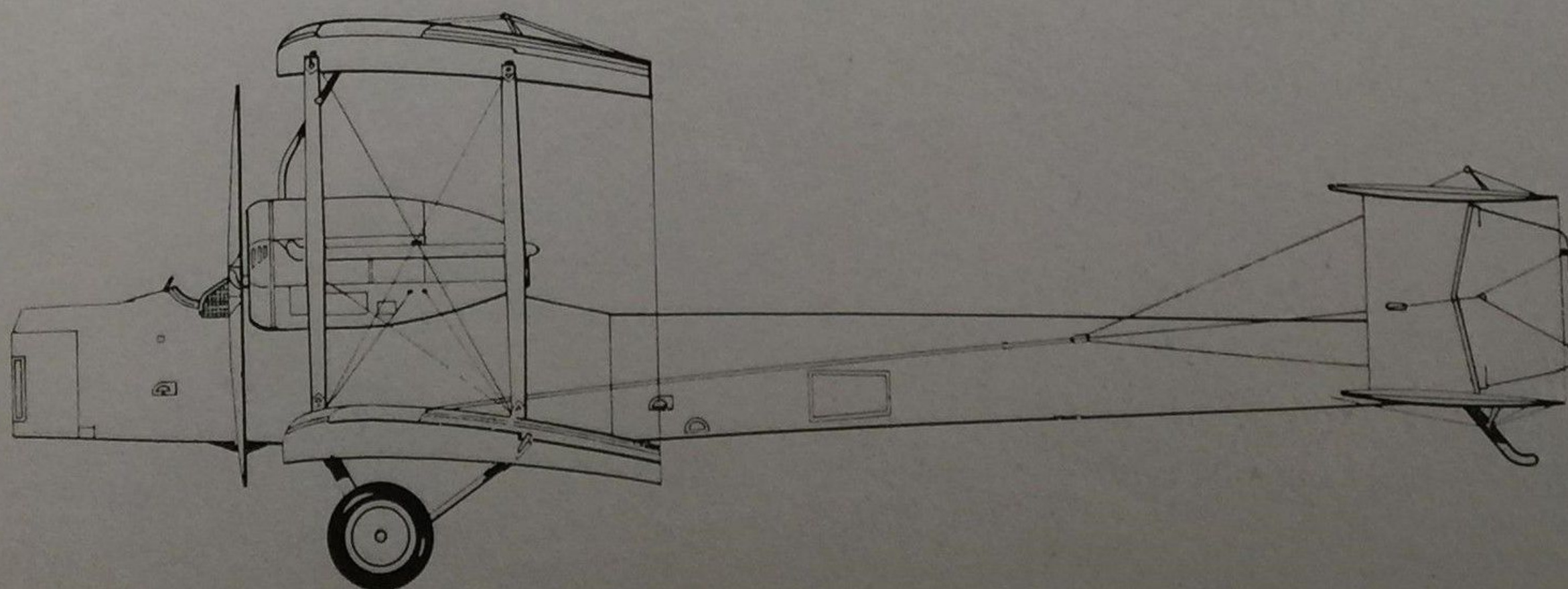
# Aerodux® in replica Vickers Vimy

On June 15, 1919, Alcock and Brown landed at Clifden, County Galway, 16 hours 28 minutes after take-off from St. Johns, Newfoundland, thereby making the first transatlantic flight. Their aeroplane was a modified Vickers Vimy bomber. To mark the fiftieth anniversary of the flight, the Vintage Aircraft and Flying Association built a full-scale flying replica of the original Vimy. The wooden structure and propellers of this replica were glued throughout with Aerodux adhesive. This article recalls the original flight and describes the building of the replica

The Vimy was first conceived and built during the last year of the first world war. Its general outlines were put down on paper by Vickers' chief designer, R. K. Pierson, at the London headquarters of the Air Board in July 1917, and only four months later the prototype, built at Weybridge, was airborne. As 360 hp Rolls-Royce Eagle engines were in short supply because of existing heavy bomber contracts, the Vimy proposal depended first upon the use of surplus 200 hp fighter engines. Even with these, the Vimy lifted a much greater load than its Eagle-powered competitor. When Eagle engines were fitted to the Vimy, the performance for its day was outstanding. In standard military trim within a total weight of 12,500 lb the Eagle-powered Vimy lifted a load of 5,000 lb (including fuel), flew at 100 mph and had an endurance of 11 hours. It was therefore chosen for production and over 1,100 were ordered, but none was in operational use before the armistice of November 1918.

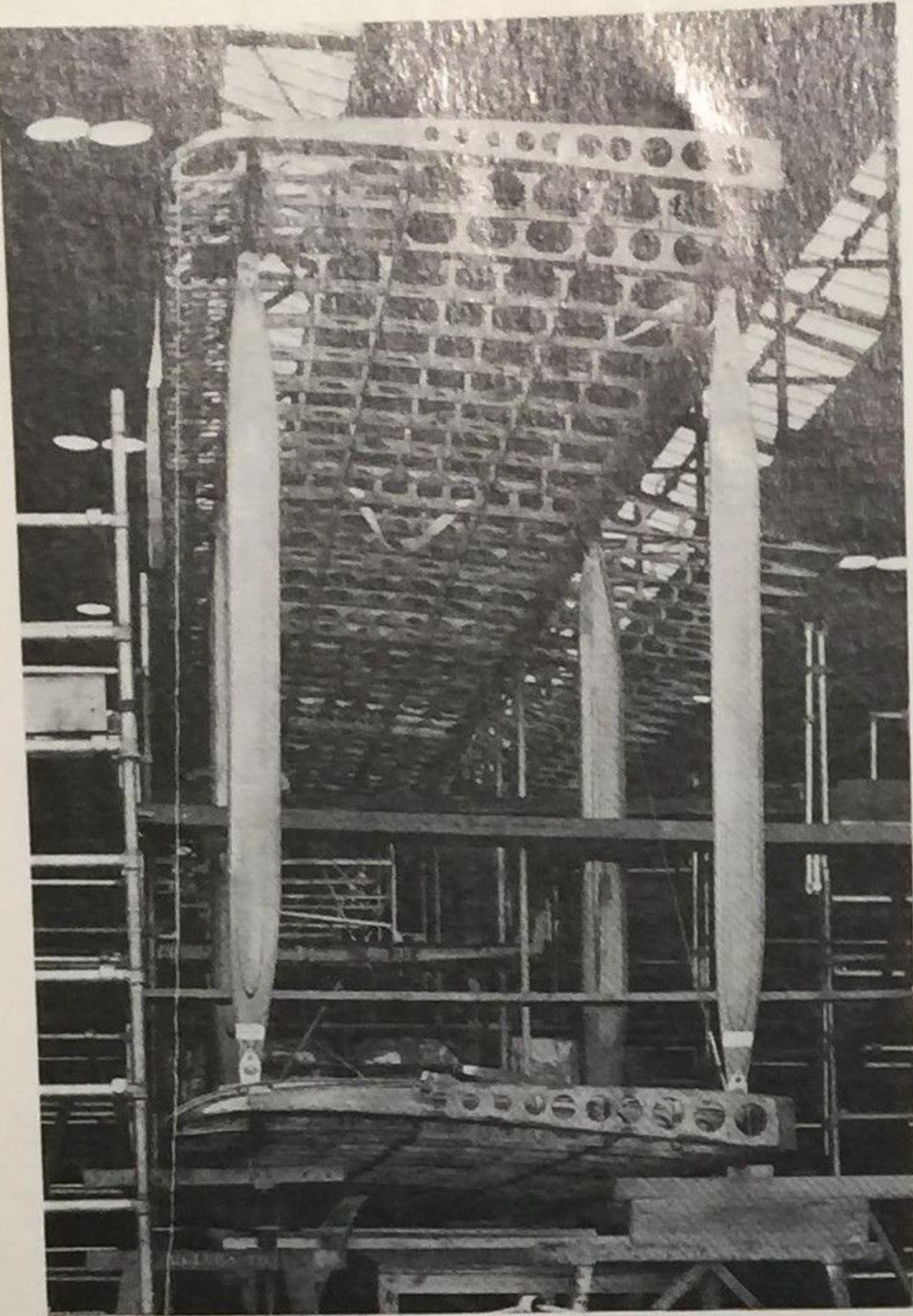
Today the airspace across the North Atlantic is the world's busiest long distance air route, carrying as it does some 1,300 passenger and cargo services a week. The passenger services provide over 83,000 seats a week in each direction. The first transatlantic flight was made in 1919 by John Alcock and Arthur Whitten Brown, two Mancunians, in a Vickers Vimy FB 27 bomber, and it is a measure of their achievement that eight years passed before another crossing of the Atlantic was made by aeroplane, and it was not until 20 years later that the first regular commercial scheduled aircraft passenger flights began over the North Atlantic.

**COVER PHOTOGRAPH** The Vickers Vimy replica flying at the Paris Air Show

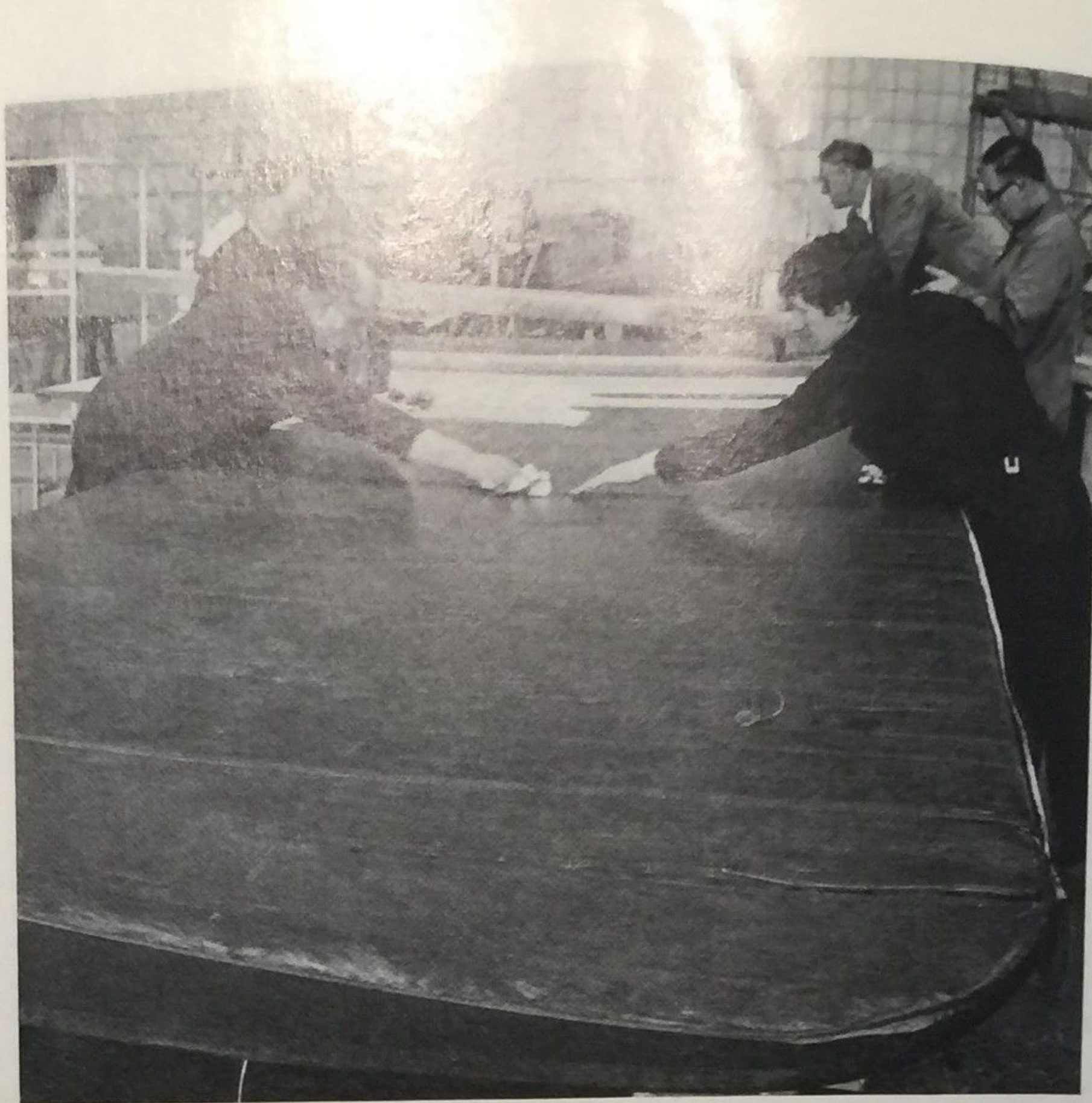


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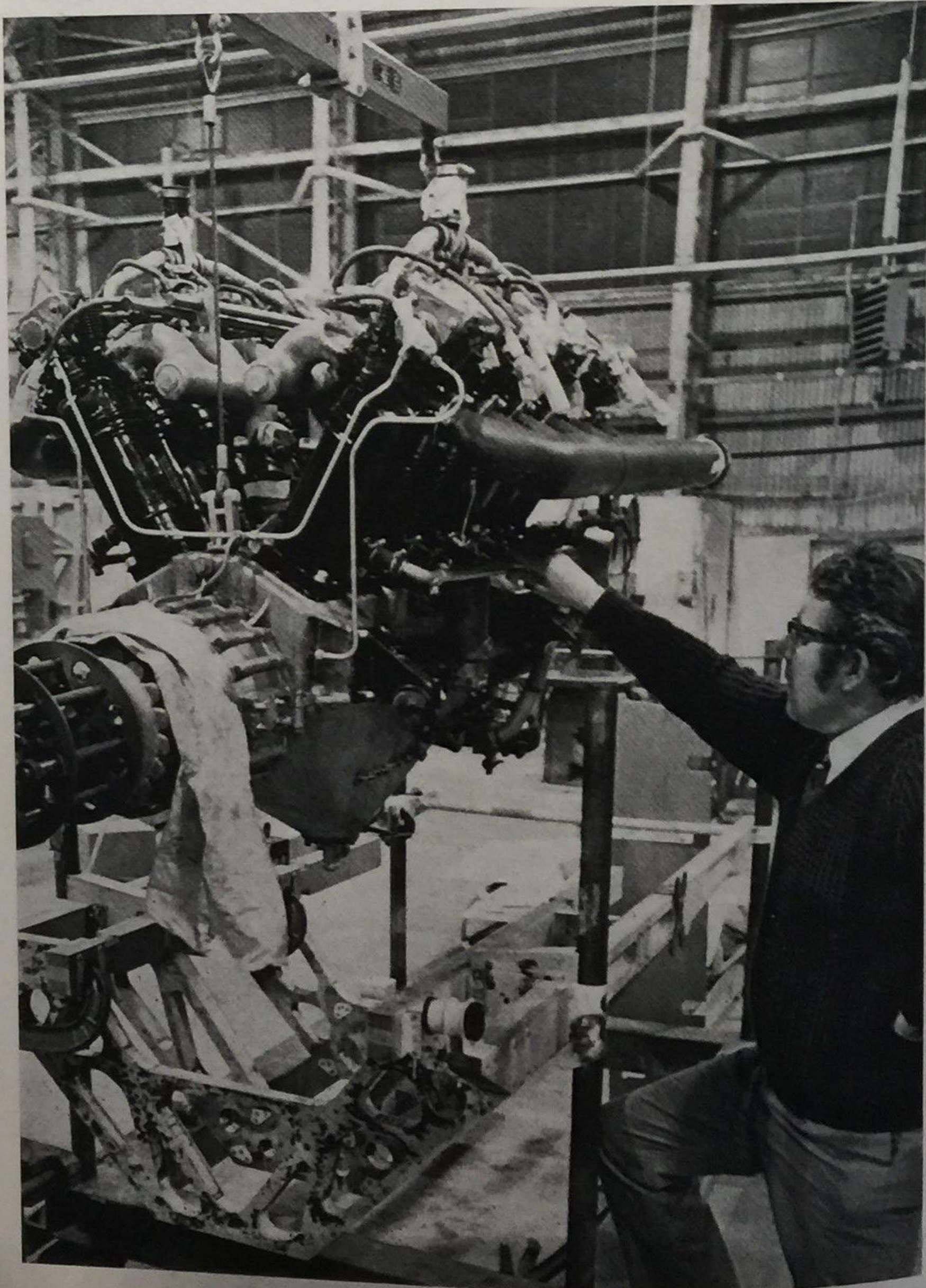
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### Ross Smith's flight to Australia

Another pioneering though less well known flight by a Vimy in 1919 was that of Ross Smith to Australia, accompanied by his brother Keith and air mechanics Shiers and Bennett.

For the Atlantic flight the Vimy's gross take-off weight was 14,000 lb, but for the month long journey to Australia, with its multiple take-offs and landings, many in very high temperatures, Ross Smith restricted the weight to 13,000 lb. The Vimy bearing the British Commercial Registration G-EAOU (God 'elp all of us, in Ross Smith's words) carried all its own spares, seven days' emergency rations and fishing hooks and lines. So equipped, the aircraft was more than 300 lb over the stipulated 13,000 lb, but Ross Smith and his crew abandoned all personal luggage and thus brought the weight within the desired limit. The 11,060 miles to Port Darwin took 27 days and 20 hours in 23 stages, and during the next few weeks the Vimy went on to Sydney, Melbourne and Adelaide, the total flying time for the 14,350 miles being 188 hours 20 minutes.



5 Preliminary assembly of main planes, showing Aerodux-laminated struts

6 Doping fabric on main plane

7 One of the two Eagle engines being lowered on to its Aerodux-bonded timber cradle



Among those who performed the skilled task of applying fabric to the aerodynamic surfaces of the aircraft was Miss Winnie Bent, of Byfleet, who began at Vickers as a fabric worker on April 14, 1925.

### Eagle engines

Introduced in 1914, Eagle engines were destined to be the first of a long series of piston engines, of 12 cylinders in V formation, which were to remain in service up to the beginning of the 1930s.

When the Vintage Aircraft and Flying Association told Rolls-Royce of their requirement for engines for the replica Vimy, the challenge to produce something really authentic was taken up with enthusiasm. Intensive research brought to light engines, which, at the beginning of the 1920s, had been delivered to the Royal Dutch Air Force and subsequently modified for use in barges on the Dutch canals. Three complete motors and several pieces were found to be available.

The task of constructing two fully reliable aircraft engines from this collection was entrusted to apprentice mechanics at Rolls-Royce, with the supervision of experienced technicians. Also available for consultation were engineers, now in retirement, who had worked on early Eagle engines.

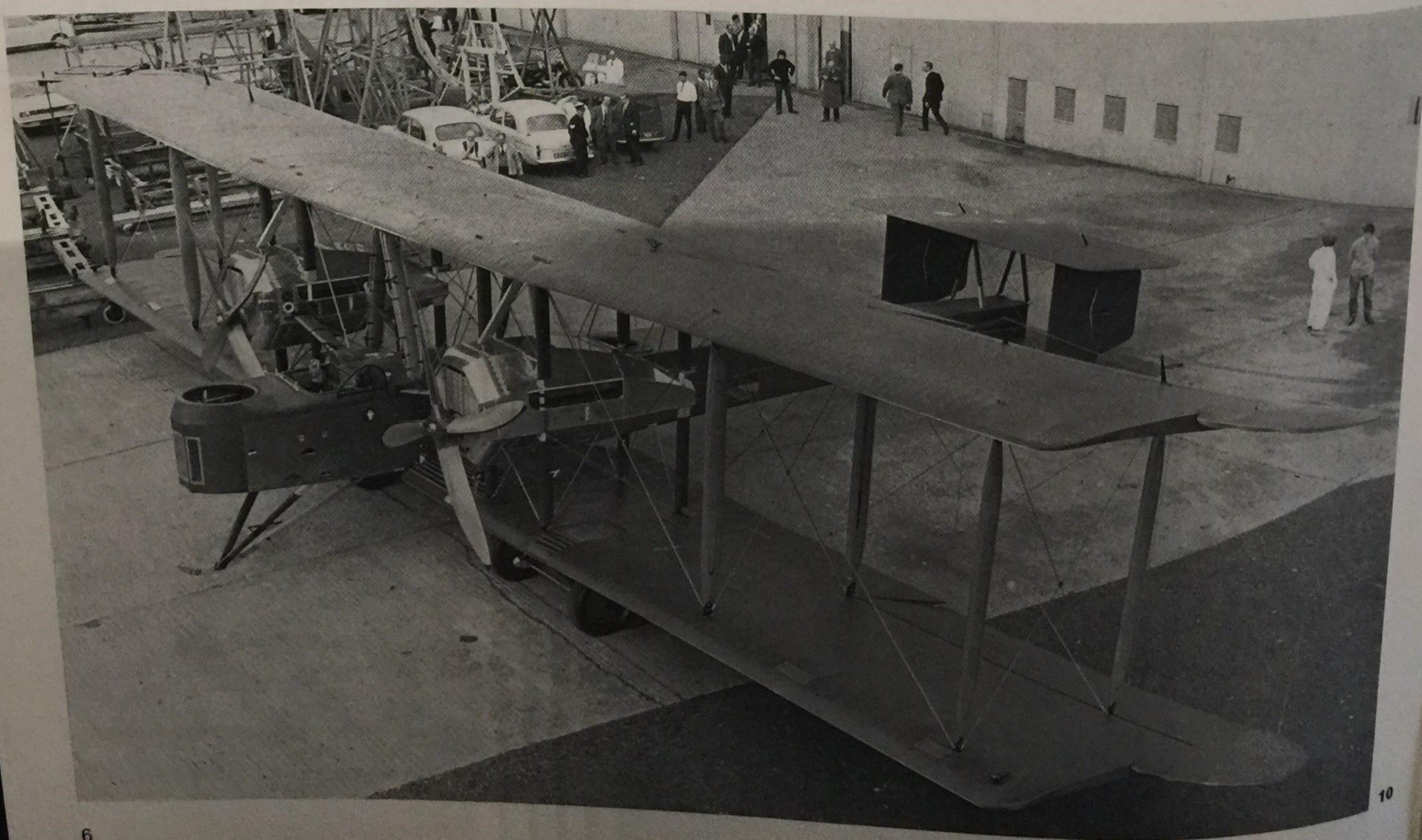
As a first step, the engines were completely dismantled and it was then shown

that the moving parts had resisted to a remarkable extent the ravages of time. Only the valve springs and certain piston parts required replacement.

When the first motor was put on test in August 1968, special precautions were taken against fire, since petrol rather than jet fuel was now being used again. For the old hands, the smell of petrol blending with the odour of vegetable oil which was being used as lubricant as in former days, recalled vividly an era which had long departed. Later it was found advisable to use ordinary modern oils. Because there was no measuring gear on the test beds, recourse was had to older and more primitive criteria, such as the colour of the exhaust gases for judging carburettor adjustment.

Ultimately the engines gave every satisfaction, developing the power originally anticipated, with a consumption of oil not exceeding 2 litres an hour.

10 The completed Vimy replica wheeled out of the hangar







8

### The replica Vimy

The decision by the Vintage Aircraft and Flying Association to build a Vimy replica was made in May 1967, the object being to complete the design and construction by June 1969, the fiftieth anniversary of the month of Alcock and Brown's flight. In fact, the project took only one month over the two-year schedule.

The resorcinol-formaldehyde resin, Aerodux, supplied by CIBA (A.R.L.) Ltd, was used throughout the structural woodwork of the machine. This adhesive is extremely durable under all conditions of exposure. It has excellent resistance to moisture and is considerably resistant to elevated temperatures; these two qualities were destined to be important in the subsequent history of the replica Vimy. The glued wooden structures include frames in the main planes, spars, struts, nose skid, tail planes, fins, rudders, fuselage and the wooden engine mountings supporting the Eagle engines with their 360 hp thrust. The laminated timber propellers were also glued with Aerodux.

The four-bladed propellers were made by a craftsman of the British Aircraft Corporation, Mr. Don Moores, who, as an employee of Vickers-Armstrongs Ltd, had built wooden Vimy aeroplane propellers in the 1920s, and was thus able to bring to the work all the talents of a craft which in recent years has largely declined.

When the premises at Weybridge were flooded in 1968, the replica Vimy propellers were immersed in flood water. They were, however, soon dried out and, after inspection by a member of Airscrew-Weyroc Ltd. as an independent expert, were declared to be unharmed, a notable tribute to the moistureproof qualities of Aerodux.



9

8 Aerodux glue being spread on propeller laminae

9 One of the four-bladed propellers clamped up for the glue to set

10



### Test flights

The aircraft was completed and lowered off assembly trestles onto its undercarriage for the first time on Friday, May 30 1969. Over that weekend, fuel flow tests, rigging and the checking of systems took place, culminating on Sunday, June 1, in preliminary engine runs. The next two days were fully occupied with final inspections and clearance for flight, and the aircraft took off from Brooklands on its first flight at 6.40 p.m. on Tuesday, June 3. The pilot on this and all subsequent flights was D. G. 'Dizzy' Addicott. The aircraft was airborne for thirty minutes before landing at the nearby test airfield of the British Aircraft Corporation at Wisley.

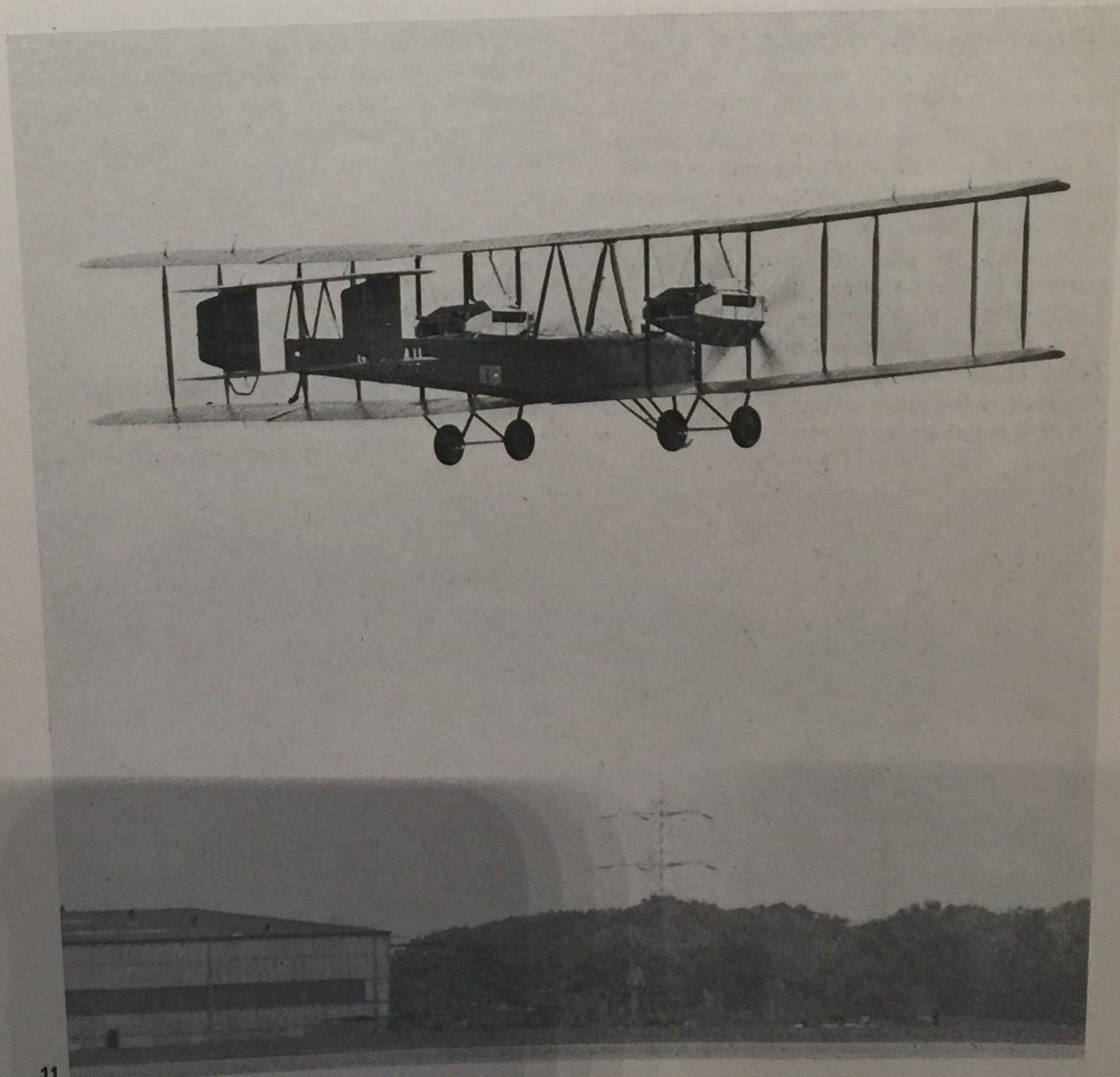
A second test flight was made the next day. However, cross-winds encountered during take-off would have made a landing back at Wisley difficult, so the aircraft was diverted to RAF Odiham, which offered a landing strip more closely aligned with the prevailing wind.

From Odiham, three further flights were

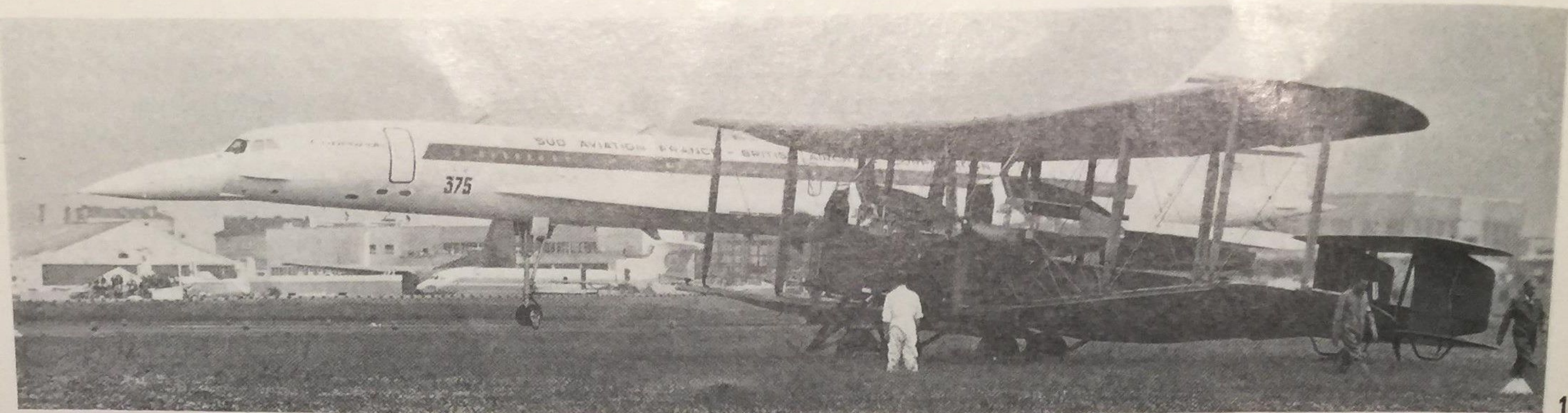
made on June 5, the third of these, with Mr. J. Carrodus of the Air Registration Board being carried as an observer, being to obtain a Special Category Certificate of Airworthiness.

Such an intensive flight test programme was necessary since Friday, June 6, had been scheduled as the day on which the Vimy would cross the Channel to appear at the Paris Air Show. Thanks to the co-operation of all concerned, the replica, appropriately certificated, arrived at Le Bourget shortly after noon that day.

11 Trial flight at Weybridge







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### On display in Paris

The aircraft was on display at Le Bourget the following weekend, and the accompanying photograph shows it about to take off immediately prior to Concorde 001 in the flying display.

On June 9, the aircraft flew back to Wisley, and was there repainted in Service markings, as opposed to the civil markings required for the appearance at Paris. On June 11, it was flown to Ringway Airport, Manchester. There it became the centrepiece of an exhibition in Alcock and Brown's home town to mark the 50th anniversary of their flight.

### Damaged by fire

The exhibition lasted for four weeks and on July 14, while being prepared to fly from Manchester to the Rolls-Royce test airfield at Hucknall, the aircraft caught fire. The cause has not been definitely established, but it is thought to have been the action of concentrated sunlight on the fabric of the wing. Damage to the aircraft was extensive. Total replacement of three of the seven wing sections is required, while varying degrees of repair are necessary elsewhere. It is notice-

able, however, that in the neighbourhood of the fire, in the frames and other elements bonded with Aerodux adhesive, the gluelines are unaffected by the heat.

Dismantled, the aircraft was brought back by road to Wisley, and the parts were stored pending a decision on the aircraft's future.

It was the wish of Vintage Aircraft and Flying Association that the Vimy be rebuilt to fly again, but their first concern had to be to clear all outstanding obligations, and the Committee vigorously investigated whether they could fulfil their intention to present the aircraft to the Royal Air Force Museum in an airworthy condition. Unfortunately it was not possible to achieve this ambition and the Vimy will now be re-built to exhibition standard.

12 The replica Vimy lines up alongside the Concorde 001 at the Paris Air Show

13 Fire strikes the port lower main plane at Manchester



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