

The Bert Hinkler Accident.

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Objective

The objective of this report is to examine the known facts of the accident and to establish the cause of the crash. A secondary objective is to assess the content of an Entry entitled Hinkler, Herbert John (Bert) (1892-1933) contained within the Australian Dictionary of Biography, Volume 9, (MUP), 1983. The Entry paragraph to be assessed states "*Independent investigation establishes that Hinkler attempted an emergency landing after the loss of a propeller blade in flight*". A Third objective is to examine discrepancies between some published statements and known facts.

Data utilised.

The data used in the examination included:

1. Report on Puss Moth Accidents. R&M No. 1699 by the Aeronautical Research Committee of the UK Air Ministry, London. Dated 1937
2. File No 5008-A16-11 Aircraft – Aircraft General Registration CF-APK DH 80A (Puss Moth) containing the registration, modification, and operational history of Mr. Hinkler's aeroplane.
3. The Journal of the Canadian Aviation Historical Society Volume 30 No.1 of Spring 1992. Item 'Bert Hinkler and Canada' detailing the works carried out for, and the flight "across the Atlantic in a Canadian Puss Moth"
4. The Aviation Safety Network data base of 94 DH80A Puss Moth Accidents.
5. Australian Aviation database "Australian DH.80 Puss Moth" a compilation by Geoff Goodall.
6. Book - Hustling Hinkler – The Short Tumultuous Life Of A Trailblazing Aviator by D R Dymock. 2013
7. Book – Bert Hinkler – The Most daring Man in the World by Grantlee Kieza. 2012
8. Dossiers of documentation compiled by Mr. I Whalley of Melbourne Victoria including correspondence between Italian authorities and Embassy Officials with the official UK Air Ministry translation from Italian into English, original photographs contained in the Italian file, Mr. Hinkler's UK Air Ministry record of Service, and newspaper articles of the period.

9. A document "Hamilton Standard Adjustable Pitch Propellers" by the Hamilton Standard Propeller Company USA dated March 15, 1935.
10. A copy of the presentation "Hinkler, And 50 Years Beyond" by Mr. John L Watkins O.B.E, B.E, D.I.C, F.I.E Aust: F.R.Ae.S., F.C.I.T. to the Institute of Engineers, Canberra Branch, and the Australian Division of the Royal Aeronautical Society, in Canberra September 28th 1977.
11. Copies of correspondence between Mr. Watkins (above) and Mr. E P Wixted of Queensland.
12. 'Lone Eagle' Documentary by Patrick Desmond 1983
13. ABC "Inside Story" documentary "Hustling Hinkler"
14. Solo by Roy Mackenzie. The second edition considers the Watkins and Wixted theories.

Introduction.

Bert Hinkler was an Australian airman who left the UK at 3.10am on 7th January 1933 for a flight to Australia. That flight was an attempt to beat the current fastest time for the journey which stood at 8 days and 20 hours established by CWA Scott. Mr. Hinkler had previously established a sound reputation for long distance flying.

Mr. Hinkler did not beat Mr. Scott's time; indeed he did not complete the first leg of the flight. He crashed on the slopes of the Pratomagno mountains in the Apennines near the town of Arezzo. This is 791 nautical miles from his departure point at London's Great West Aerodrome, now known as Heathrow (LHR). The wreckage of the aircraft, and the partially mummified body of the pilot, were found on April 27th the same year.

The available records contained within the Data indicate that the crash site was at an altitude of 6,500 ft. It was found that the aviator's body was 30 yards (about 90 feet or 27 meters) from the main wreckage, and was on the same trajectory from the wreckage as the main fuel tank. It was also found that the right wing was found 250 yards (about 750 ft. or 228 meters) from the main wreckage. Unfortunately, although photographs are available showing the main wreckage site, there is no photographic or graphical evidence of the distribution of all the wreckage. The available records use a mix of units, which have been converted as shown above.

The Aircraft.

The DH80A Puss Moth was manufactured by De Havilland Aircraft Company in the UK. First flown in 1929, a total of 284 were manufactured for the UK markets with a further 25 built for DH Canada before production ceased in 1933. In its early operational life the aircraft

suffered a number of fatal accidents of which nine were investigated extensively by the British authorities.

Their report at Data 1 concluded that aerodynamic forces initiated by turbulence caused one wing to separate in flight on all nine aircraft. Numerous corrective modifications were introduced to alleviate the problem.

Bert Hinkler's aircraft, s/n 2049 manufactured in 1930, was one of those built for Canada and on 28th April 1931 it was registered to Mr. Hinkler. On 4th July 1931 Mr. Hinkler advised the Canadian authorities that he was modifying the aircraft for long distance flight by removing seats and windows and fitting extra fuel and oil tanks. Mr. Hinkler then flew the aircraft from Canada to England with stops in Jamaica, Brazil, French West Africa and Spain.

On arrival in the UK the aircraft received an extensive overhaul and had numerous strengthening modifications fitted. Some of these modifications are as a result of investigations into fatal accidents to the type and these are listed in Data 1 above.

At the subsequent test flight on 7th November 1931 it was detailed that the cruising speed at 1980 RPM was 110 mph / 95 knots and at the maximum of 2340 RPM it was 134mph / 116knots. The maximum authorised weight was 2050 lbs. / 924 Kg. The aircraft retained its Canadian registry as CF-APK. At this time its total flying time was listed as being 220 hours 59 minutes.

The Wreckage and Site Investigation.

The wreckage was discovered by woodsmen after the winter snows had melted, on April 27th some 114 days after the accident. Local authorities were alerted.

The authorities comprising police, military personnel and doctors, as well as local officials, attended the scene with the police report noting that '*curious onlookers were present*'.

Photographs were taken and reports made accordingly. Copies of reports and photographs are contained in the Dossier listed as Data 8.

In a number of witness statements some varying guesses were made as to distances separating various aspects of the wreckage trail. The Commanding officer of the Italian Air Force station at Pisa in answering questions for the British authorities stated that a separated wing was approximately 250 yards (820 ft.) from the main wreckage, this seems to equate with many of the other estimates. However nowhere is there a definitive record of whether it was the left or right wing, although our examination of the available photographs of the accident site indicate it must have been the right wing.

Of particular interest is the report by Ghedini, Giuseppe di Ezio, a pharmaceutical chemist. Mr. Ghedini in his report states "*I was interested above all in clearing up the reasons for the*

accident, because, having had aviation service and being a Reserve Officer, I was fascinated with this particular research."

Mr. Ghedini was a Reserve Officer in the Italian Air Force and one would assume that Mr. Ghedini was somewhat familiar with aircraft, and his report shows he was able to correctly identify components and describe damage in rudimentary technical terms.

In his report Mr. Ghedini said "*I have reconstructed the accident, considering that during the course of the flight the plane had collided with the tip of its right wing, some trees with tall trunks, arising either from the limited visibility or fog or the effects of the weather which in that area can come up unexpectedly and violently*"

I have highlighted 'right wing' because the wreckage photographs only show the left wing, as seen here in photograph RB11591/1 in Data 8. I have circled the aileron sprocket and link which is on the lower surface of the wing, and have indicated the tip – the wing root is on the right of the photograph. As this is the lower surface of the wing it confirms that it is the left wing. Also note the wing tip is quite disrupted.

Photograph RB 11591/1



Mr. Ghedini stated "*the plane had collided with the right wing with some trees.*" However the right wing could not be identified within the wreckage photographs examined. Did Mr. Ghedini misidentify the wing in the wreckage, and was he not aware of the wing 250 yards (750 ft. / 228 meters) from the wreckage? It is more plausible that he saw the tip damage on the right wing, and that was what he was referring to.

There are no photographs of this displaced wing but one may conclude that had it fluttered down following a disruption event that it almost definitely sustained some damage from the subsequent collision with terrain.

One could ask why Mr. Ghedini did not mention the fact that one wing was at a distance from the main wreckage when he did note the much shorter distances between the main wreckage, the fuel tank, and the body.

While there are various mentions of fabric possibly being ripped by trees there is a statement by the Air Force CO that *"Upon examining the surrounding trees no sign was found which would show that the machine struck trees while in flight."*

Much later statements were made in Australia *"the aircraft lost one propeller blade in flight and Mr. Hinkler was attempting to force land the aircraft when it collided with a tree, which separated one wing, following which the remainder of the aircraft travelled 250 yards (750 ft/ 228 meters) before impacting the ground and ejecting Mr. Hinkler and the cabin fuel tank"*

Within the extensive correspondence at Data 11 there is no factual evidence to support this scenario, nor is it contemplated in Data 1 which extensively examined a further nine similar Puss Moth accidents. However it is necessary to discuss the matter.

I previously owned the particular Puss Moth which is on display in the Hinkler Museum in Bundaberg Qld having saved it in derelict condition, from being taken to the tip. The wing structure is of very light construction and my experience as an aircraft engineer, and an aircraft accident investigator, leads me to conclude that for a Puss Moth wing to impact a tree with sufficient force as to rip it from the fuselage, the wing would be wrapped around the tree and totally destroyed. The left wing in the wreckage does not exhibit such damage. The evidence in Dossiers at Data 8 has many references to a wing *"Standing up against a tree"*, not wrapped around it.

The Puss Moth would have a minimum approach speed of 60mph (98 kph / 52 knots) and using a unit we are readily familiar with of 98kph we can understand the forces generated by a car if it hits a tree. Therefore similar forces would have been applied to the Puss Moth had it impacted a tree at the crash site.

Any aircraft losing a wing would immediately commence a severe rolling force from the existing wing and would dive into the terrain at an exceeding short distance from the impact point of the wing, not 250 yards (750 ft./ 228 meters) as observed at the crash site. There is no evidence of any wreckage trail other than just in the immediate area of the wreck. Being able to fly ballistically with only one wing for 250 yards (750 ft./ 228) meters is not a plausible scenario for any aircraft.

The statement regarding the loss of one propeller blade requires examination. The site wreckage reports contain a statement that *'the machine could not have slid along the ground after falling in view of the fact that the engine and one blade of the propeller were buried in the ground. The former was buried 10cm (4 inches) and the second by more than half its length.'*

This Queensland Museum photograph LD51/17 contained with Data 8 is reproduced here and shows the engine, nose cowl and propeller. In the photograph the visible remains of the propeller are circled.

Photograph LD51/17



At the top of the photograph is the tip of one blade and at the bottom is the propeller hub with the other blade missing. The hub has the blade securing bolts on the one side of the hub still in place. The other side cannot be seen, however there appears to be no distorting of the hub which would have occurred had a blade been ejected in flight due to hub failure, or bolt looseness.

As previously mentioned, a site report states that one blade was in the ground for half its length. However this is not seen in any photographs. Nor can we adequately see the end of the hub where there is no blade in place. Therefore we cannot determine by what manner that blade was disrupted from the hub. The impact with the terrain was very severe as can be seen by the damage to the engine and adjacent structure.

It may be that later observers of this photograph could deduce that one blade was ejected from the hub however there are no site reports which point to one blade being missing. One would assume that at least Mr. Ghedini was sufficiently familiar with aircraft to have noted a missing blade.

In the event that a wing was separated from a fuselage in flight the resulting plunge to the terrain by the remaining wreckage would result in the propeller being the first assembly to impact terrain. The reported fact that one blade penetrated to half its depth is plausible. With the violence of the impact it is not surprising that the remainder of the propeller was dislodged in the subsequent severe disruptive forces, the results of which are seen in the photograph.

Puss Moth aircraft were normally fitted with a two bladed propeller of wooden construction of one piece, bolted to the propeller crankshaft. During modification in Canada for long range cruising Mr. Hinkler had a metal, ground adjustable, two bladed, Hamilton Standard propeller fitted. These were well known and widely used in the 1920's and 1930's to improve the performance of light aircraft and are still in use today on existing vintage aircraft. They are light and reliable but need careful adjustment on the ground to ensure both blades track accurately. Out of track blades are easily noted because of increased vibration. A pilot as experienced as Mr. Hinkler would have adjusted his blades for maximum economy for his long flights and would have readily noted any out of balance and have it rectified.

Statements were made in the videos at Data 12 and 13 that the aircraft was possibly interfered with, which led to the loss of one propeller blade. If it were that the hub securing bolts had been tampered with, any subsequent blade looseness would immediately be noticeable by the increased vibration at start up. It is inconceivable that such would be ignored by any pilot, let alone by Mr. Hinkler who was not only highly experienced but also had so much at stake in ensuring the success of this venture. The available photograph showing one blade missing from the hub is not evidence that it was ejected in flight in that the severity of impact could have dislodged that blade, and it may well have been the blade which was observed with half its length in the ground.

Although there are anomalies in the written evidence, and shortcomings in the available photographs, there is no evidence that the aircraft was forced to land, or that a wing impacted a tree while in flight.

The possibility of survival.

The Italian authorities appointed two medical doctors to attend the site and prepare a report for the Public Procurator. They were Dr Domenico Vettori and Dr Masieri Nero. The subsequent reports are contained within the Documents at Data 8. Without recounting the full medical details here I quote here the conclusions.

“On the questions posed, the two experts replied in agreement:-

Cause of death was undoubtedly the fracture of the cranium and the facial bones: the thoracic-adoiminal injury with consequent internal damage is of less importance in comparison with the first.

Death would have been all but immediate and occurred doubtlessly several months ago. The atmospheric conditions and the locality slowed down the symptoms of bodily decomposition:

Within Data 8 there are documents which contain later claims that Mr. Hinkler crawled away from the wreckage before later dying.

Dr Domenico Vettori noted *“Close to the body a depression was noted on the ground about 10cm (4 inches) deep and about 40cm (16 inches) width at its maximum and also in the immediate vicinity and its continuance of the abovementioned another depression. I drew the impression that these signs indicated how the body must have been projected violently from the fall, hitting first the head and then the lumbar region: since however the body was found in a supine position at about 30 or 40 cm (12 or 16 inches) from these impressions, it was presumed death was not instantaneous, in the sense that the body of the deceased must have had some last movements after the fall in the manner of straightening itself and taking the position described above”*

These factual site reports from the two doctors disclose that Mr. Hinkler was ejected and impacted the terrain with such force that death was almost instantaneous although there is the possibility that post impact movements could have occurred which allowed Mr. Hinkler’s body to move slightly from the body’s impact site.

Flight time and accident time.

Evidence in relation to flight time and accident time is confusing. It is definite that the aircraft departed London at 03.10 am because two named witnesses made statements as to the start-up and departure times. The wreckage location was established as 791 miles from London. Mr. Hinkler recorded that he was at Florence (40 miles from the crash site) at 6.55 am. Presuming Mr. Hinkler had remained on London time this gives an elapsed time of 3 hours 15 minutes and calculations show to attain this he would have had to cruise at 210 mph. Given that test flying showed a cruise speed at 110 mph the 6.55 figure was more likely an elapsed time. This would give a cruise speed of 133mph which, given the northerly

winds he had experienced from takeoff, was quite attainable, as it represents a tail wind of 23 mph.

Given the time zone difference of one hour the time at Florence would be 10.05 am local. In Data 12 the last remaining witness said that she and others saw the aircraft which at 10.05 am would have been in daylight. If however the 6.55 was London time it would be 7.55 am Florence time and on the 7th of January in the middle of winter that area would still be in pre-dawn darkness and sighting of the aircraft may have been problematical.

Conclusions.

The Entry paragraph in the Australian Dictionary of Biography in question states:

“Independent investigation establishes that Hinkler attempted an emergency landing after the loss of one propeller blade in flight”

Conclusion 1. Within the Data there is no evidence of an independent investigation having been carried out.

Conclusion 2. Within the Data there is no evidence of an attempted emergency landing.

Conclusion 3. Within the Data there is no evidence that a propeller blade separated in flight.

Other Comments.

1. Within the Data there is no evidence of any tampering with the aircraft prior to its departure on this flight.
2. Within the data there is no evidence that Mr. Hinkler survived the impact and crawled from the wreckage.
3. The Puss Moth was known for the in-flight failure of one wing, occasioned by turbulence. Similar occurrences happened well beyond the date of Mr. Hinkler’s event. Indeed, a similar accident occurred in Australia in 1941. Many modifications were made in an attempt to mitigate such events. Reporting of the accidents and the modifications recommended are contained within the Data.
4. It should be noted that this aircraft was flown across the Atlantic without any problems. This flight required maximum endurance. The fatal flight was a record attempt and required maximum speed. The actual crash happened in severe turbulence. High speed and turbulence were certainly contributing factors.
5. The wings of the Puss Moth were able to be folded. Consequently there was no main spar running the length of the wing. This design resulted in flutter in severe turbulence at high speed.

6. All available evidence suggests Hinkler's death was due to a combination of a design fault which caused wing flutter and conditions of high speed and turbulence.
7. There are obvious difficulties involved in investigating this crash. The crash occurred in January 1933 but was not discovered until April 1933. Mention is made of an Official Investigation into this crash by Italian Authorities. Research indicates this document was destroyed during the Second World War. The Investigation above was compiled using photographs and documents. Examination of the wreckage was not possible. If anyone has a copy of the Italian Report or other relevant material please contact me.

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