



Recovery report detailing the excavation of a historic aircraft crash site:

Armstrong Whitworth Whitley BD381

Crashed 6th of May 1943

Near Dewshill Farm, Shotts



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Licensed by the Service Personnel & Veterans Agency

Ministry of Defence

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Introduction

Project:

The project detailed in this paper is the excavation of a historic aircraft crash site carried out under the terms of a licence granted by the Ministry of Defence, Service Personnel and Veterans Agency under the Protection of Military Remains Act 1986. This licence was issued on the 5th of August 2015, No. 1814, and is valid for one year.

The site investigation was carried out, primarily, by members of the Dumfries and Galloway Aviation museum on an entirely voluntary basis. It was conducted following the guidelines of the British Aviation Archaeological Council, reproduced in the Appendix .

Site:

The crash site is located in a pasture field at NS 8590464160 (Landranger sheet 65) 0.25km SE of Dewshill Farm, 3.5km NNW of Shotts , North Lanarkshire, and lies just North of the M8 motorway.



Figure 1, Extract from the OS 1:50,000 Series with the crash site marked.

Image produced from Ordnance Survey's Get-a-map service.

Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland



Figure 2, Aerial photograph of the crash site (marked with red x)

Image courtesy: Bing Maps

Terrain:

At the time of the accident the crash site was in a pasture field, which is similar to the current land use. The site lies between two quartz – dolerite igneous intrusions dating from Carboniferous to early Permian with a base layer of boulder clay. There is a peat layer of unknown depth, just under the surface.

Aircraft:

The Whitley was a twin engined heavy bomber with a crew of five first flown in 1936, entering service during March 1937. In total 1814 Whitley aircraft were produced before it ceased production in June 1943.

They were used extensively for anti-submarine patrols and also for training, troop carrying, leaflet drops and SOE work involving agent drops etc.

The mark five specifications were:

Length – 22.09 m Wingspan – 25.59 m Cruising speed – 185 mph Range – 1650 miles

Armament – 1 x .303 Vickers machine gun in the nose and 4 Browning machine guns in the tail.

Powerplant – 2 x Rolls Royce Merlin Mk. X engines, each with 1145 hp.



*Figure 3, Armstrong Whitleys on the ground.
Image courtesy: <http://raf.mod.uk>*



*Figure 4, Paratroopers inside the fuselage Figure 5, Inside the cockpit
Images courtesy: Yahoo image search*

Figures 4 and 5 show how cramped it would have been inside the Whitley aircraft.

Previous Investigation Work

The site was investigated previously by Mark Evans of the Midland Aircraft Recovery Group who managed to speak with an eyewitness. She remembers a large crater in the field and an engine lying in the burn . Small pieces of molten alloy were found in the burn but no evidence was found of a crater so, no further investigation was carried out at that time.

Members from the Dumfries and Galloway Aviation Museum and Mark Evans visited the site on the 22nd of June 2013 and carried out a magnetometer search of the field. Two small iron signals were obtained.



Figure 6, Magnetometer survey (similar conditions to Dewshill Farm) Stevie Spink

Archaeological Context

The site, by the very nature of it only having existed since May 1943, sits within the most recent era of the modern age in so far as its archaeological context is concerned.

Holyoak and Schofield state in their opening paragraph that “military aircraft crash sites are an important part of Britain’s military and aviation heritage”. Most sites in the UK date from around the time of the Second World War. Many in the area are on upland terrain with visible surface wreckage, but those, like Whitley BD381 and others on the lower ground and pasture fields only have buried wreckage. Very few of the sites with buried remains have substantial pieces of the aircraft remaining, it is only when aircraft struck the ground at a steep angle that larger parts tended to be driven into the ground to a depth that they were not recovered at the time.

The history of excavating crash sites began in earnest in the 1960s with groups of enthusiasts digging, more or less at random, to recover particular items. These digs were not well recorded and often the artefacts recovered have been lost, sold or scrapped. These digs were not entirely successful and it is reported by Holyoak and Schofield that “it was not at all unusual for sites to be successively excavated and re-excavated by more than one group over several years”. This tends to be the case in England but in Scotland there are not as many groups or individuals carrying out digs.

After consultation with Historic Scotland, there are no known sites of archaeological importance within 1 km of the crash site, the nearest being Dewshill Colliery.

The crash of the Whitley will, in all probability, have destroyed any sub-surface cultural heritage deposits if they were present. This notwithstanding, if any non-crash site artefacts are encountered, their presence will be noted and reported to North Lanarkshire HER.

Historical Background

Whitley Mk. V BD381 was delivered, between February and July 1942 by Armstrong Whitworth at Baginton, to 19 OTU where it was assigned the letter code 'V'.

On the 6th of May 1943 the aircraft took off from RAF Kinloss at 13.45hrs on a cross country flight. After approximately 3 hours of flying , whilst cruising at around 10,000 feet , there was a loud explosion and the port engine failed. A moment later it was noticed that an outbreak of fire had occurred in the vicinity of the rear of the port engine nacelle. Smoke began to fill the cockpit and the pilot ordered his crew to abandon the aircraft. He managed to turn off the fuel and press the Graviner switch , which had no effect. The fire spread rapidly and the port wing and engine broke away sending the aircraft diving to the ground from which the pilot was unable to escape. All other crew members managed successful parachute descents.

Crew information

Pilot : Sgt. Leslie Raymond Thomas (23) Service No. 658115

Buried - Malden (St. John the Baptist churchyard) London

Crash examination

The following was taken from the investigation report carried out by the Accidents Investigation Branch:

Examination of the wreckage revealed that the port wing had failed in air due to the effects of the fire. It was evident that the fire had been most intense behind the engine bulkhead, the engine itself was only slightly effected by fire. Evidence suggests that the Graviner bottle , which is mounted behind the bulkhead, had exploded in the air and the explosive head of the bottle had not been discharged. The crew stated that the pilot had pressed the Graviner button and nothing had happened which suggests that the electric cables to the bottle had been burnt through before the fire had been detected.

Examination of the port engine revealed that connecting rods 6A and 6B had fractured and penetrated the sump and crank case. This was possibly due to slack cap bolts. The fire started due to the oil leaking from the fractured crank case and sump. Structural failure of the port wing was due to the fire.

From the evidence available it would appear that the pilot carried out the actions to the best of his ability but, owing to the unfortunate circumstances, was unable to control the fire or leave the aircraft.

Eyewitness report

Some 10 years ago Mark Evans (Midland Aircraft Recovery Group) managed to speak with an eyewitness , who observed the aftermath of the accident. There were two separate impact points in the field , one next to the burn containing wreckage and another further into the field causing a large crater. The RAF spent at least three days at the crash site and eventually the crater was filled in by the farmer. It was not noted if slag from the nearby Dewshill Colliery was used to complete the task. The colliery closed sometime in 1943, the exact date is unknown.

Objectives

The principle objective of the project is to recover by excavation parts of the aircraft from the crash site and display them in the Dumfries and Galloway Aviation Museum. It is hoped that one engine is still buried on site.

It is not the aim of this project to carry out any crash investigation, firstly because this was carried out at the time of the crash and secondly there is likely to be insufficient evidence remaining at the crash site after 70 years. It should still be possible to determine the angle of impact and whether the engine was running at the time of impact.

All work will be carried out within the conditions of the licence granted by the Ministry of Defence and the guidelines of the British Aviation Archaeological Council (Appendix) and any other guidance received.

Programme of works

The crash site was visited on the 22nd of June 2013. There was no visible wreckage or depression in the ground. A few strong metal detector readings were obtained within in an area of marsh grass next to a fence line beside a small burn.

The licence was valid from the 5th of August 2015, for one year. Excavation is likely to be undertaken during the summer months to make use of longer days and potentially better weather conditions.

Recovery of wreckage from aircraft crash sites is normally carried out with the assistance of mechanical excavators due to the depth of burial and weight of many aircraft components. For these reasons it is proposed that mechanised assistance will be utilised during the course of any recovery from this crash site. Toothless buckets will be used and the spoil dumped on tarpaulins. It is not envisaged that the engine will be down more than 6 metres, but if so shoring would be used. Holes would be backfilled and returned to pre-dig conditions.

The exact extent of excavation will be decided by using metal detectors and prevailing ground conditions at the time.

As the site was emplaced in a single event, with the possible exception of some surface remains being buried in the impact crater, the wreckage is expected to be in the same relative positions to parts on a complete aircraft, though compressed by impact forces. The fuselage remains are, from experience of other sites, normally located at shallower depths and engines tend to penetrate furthest into the ground. Some excavation by hand may be carried out but the bulk of the work will be conducted mechanically. Smaller items wreckage, which make up the majority of finds, are normally recovered from spoil removed by mechanised means. This practice has evolved due to the limited time available for recovery relying entirely upon voluntary contribution and often a desire by landowners to have any work conducted as swiftly as possible.

Recording

One of the volunteers in attendance will be asked to keep a photographic record of the recovery showing various stages of the work and any items which are deemed to be of importance, noting where the items were found and with appropriate scales. Another will be asked to keep a written log which it is envisaged will include details of major items with appropriate distances and directions for later reporting. The MoD require a list of all parts of the aircraft which have been recovered which also will form part of the overall report.

Conservation

All items recovered from the crash site will be returned to the Dumfries & Galloway Aviation Museum for conservation prior to completion of the declaration of finds being completed, from which the MoD consider whether to retain any items (after consultation with the RAF museum at Hendon).

As all military remains belong to the MoD, Treasure Trove laws are not applicable.

Conservation will be carried out by museum volunteers, a number of whom have attended an RAF Museum conservation course designed to instil best practice for the conservation and restoration of aircraft parts. A WD-40 type fluid would be coated on cleaned parts from hand sprayers.

Post excavation reporting

Once work on the site has been completed the findings will be reported by the appropriate means and within the timescale required under the MoD licensing scheme. Copies will be deposited as required along with a copy kept by the Dumfries & Galloway Aviation Museum and British Aviation Archaeological Council.

The timescale within the licence may not allow our full findings to be recorded as some information may only come to light after any recovery has been concluded. If any information comes to light at a later date this will be added to the report held by the museum.

A copy of the final report will be sent to:

North Lanarkshire HER

Discovery and Excavation – Council for Scottish Archaeology.

Aviation Archaeologist Magazine – BAAC

Health and Safety

In accordance with health and safety regulations all members working at the site will have high visibility vests on and wear hard hats and steel toed boots when working near any plant that is on site. A banksman will be allocated for the vehicle.

Any wreckage recovered will be placed in plastic bags to avoid contamination of the land.

SEPA guidelines will be followed if any soil becomes contaminated with fluids like oil, fuel etc.

Spill kits will be carried along with first aid kits.

Description of machine excavation on the 30th of July 2016

Before the machine arrived on site another metal detector survey was carried out and targets marked with wooden stakes. A magnetometer survey provided two small targets. The signals were all within a three metre area of marsh grass.



Figure 7, Looking NW from crash site. (Ken Law)

Figure 8, Looking south from crash site. (Ken Law)

The machine was brought in and scrapes of around 15cm depth were taken off the area and then scanned with a metal detector:



Figure 9 , Scanning the area after each scrape. (Mark Shelden)

A few molten pieces of alloy and small fragments were found until , at a depth of 90cm , a large burnt area containing a concentration of metal fragments were found:



Figure 10, Burnt area at 90cm. (Stevie Spink)



Figure 11, Looking south along trench. (Ken Law)

The trench was widened and taken down to 90cm over a three metre area where hand digging commenced.

Most of the parts recovered were from the front turret with some others obviously thrown back by the RAF recovery crew:



Figure 12, Camera control unit



Figure 13, Undamaged control unit.

(Image courtesy :Yahoo image search)



Figure 14, Navigational computer. (Mark Shelden) Figure 15, Undamaged computer.

(Image courtesy: Yahoo image search)

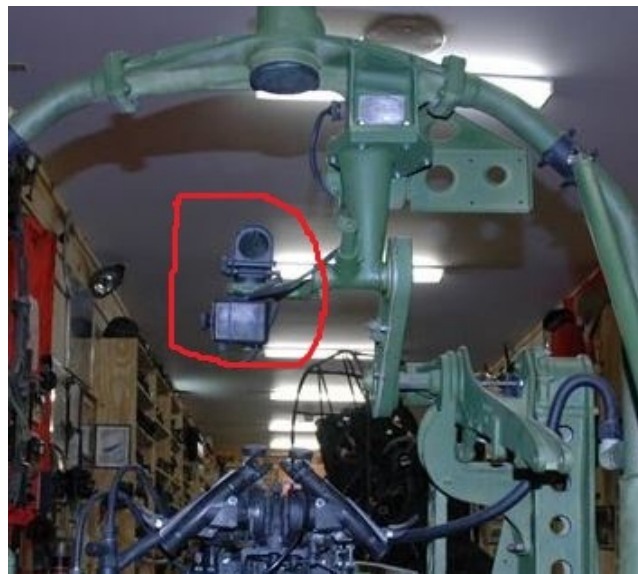


Figure 16, Reflector gun sight

Figure 17, Gun sight in position, circled in red.

(Image courtesy : Yahoo image search)



Figure 18, Undercarriage lock

Figure 19, Rudder pedal



Figure 20, Armour plate from seat.



Figure 21, Thermostat. (Mark Evans)

At a depth of 155cm the natural boulder clay was reached, thus determining the maximum depth of penetration of wreckage. A builders bag was filled with wreckage which will be washed and identified in due course.

CONCLUSION

The remains recovered suggest a fire, which corresponds to the official report, with most wreckage being from the front turret area. Maximum ground penetration was 155cm. As no engine parts were found it must be concluded that the port engine, recovered at the time, did not impact the ground at the same place as the front turret. A few pieces were also found which had been thrown back by the recovery crew at the time, with most of the wreckage being recovered.

No evidence could be found of a crater, mentioned earlier, that had to be filled in by the farmer at the time. It is concluded that this crater was the impact point of the port engine that had been recovered by the RAF at the time of the crash.

As an engine was not found it was impossible to calculate the angle that the aircraft hit the ground. Time constraints curtailed any further survey of the burn, 2 metres to the north of the site, where an engine was supposed to have been recovered by the previous farmer, some time earlier.

Project team

While the project is being conducted under the auspices of the Dumfries & Galloway Aviation Museum the licensing scheme only permits a licence to be held by a named individual. For this aircraft the licence is held by Alan Leishman, museum researcher.

Recovery work would be conducted by volunteers from the Dumfries and Galloway Aviation Museum, who are covered by the museum's public liability insurance.

Members of the Peak District Air Accident Research , namely Alan Clark and Mark Sheldon.

Mark Evans of the Midland Aircraft Recovery Group, and information officer for the BAAC, also in attendance.

Conservation of any parts recovered would be carried by volunteer workers again from within the museum's membership.

The main team consists of:

Alan Leishman – Licensee and first aider with 30+ years of aircraft recovery.

David Reid – Museum curator with 40+ years of aircraft recovery and preservation, from small pieces to complete aircraft and holder of museum firearms licence.

Alan Thomson – 30+ years of aircraft recovery and parts identification.

Stevie Stockdale – Ex. police firearms expert and holder of gun club firearms licence.

References

Historic Scotland via <http://canmore.org.uk>

Service Personnel & Veterans Agency (2007), Crashed Military Aircraft of Historical Interest: Licensing of Excavations in the UK, Guidance Notes for Recovery Groups. Ministry of Defence.

Holyoak, V. and Schofield, J. (2002), Military Aircraft Crash Sites, Archaeological Guidance on their Significance and Future Management, English Heritage Publications.

Ordnance Survey, Online Get-a-map, <http://www.ordnancesurvey.co.uk>.

Bing maps, <http://bing.com>

Yahoo image search

<http://raf.mod.uk>

The National Archives - Operations book for 19 OUT

RAF museum - Form 1180

Acknowledgements

Alan Clark, Peak District Air Accident Research

Mr Waddell, Dewshill Farm

Graham , digger driver.

SPVA-JCCC (Historic), Licensing Authority.

Appendix

Relevant section of the Code of Conduct of the British Aviation Archaeological Council (sections 1 to 5)

The BAAC voluntary Code of Conduct is a guide to best practice for aviation archaeology.

1. Legal requirements

- 1.1 It is a legal requirement that groups apply for a licence to recover remains of each aircraft lost while in military service, under the provisions of the Protection of Military Remains Act. It is not necessary to complete the MoD land owner pro-forma.
- 1.2 The permission of the owner of the land is essential, both for entry on to the land and for excavation and/ or salvage work. A BAAC pro-forma or a letter from the land owner may be used to provide evidence of permission for obtaining an MoD licence.
- 1.3 Consent from other interested bodies will be obtained where applicable. These include, but are not limited to the Receiver of Wreck, Environment Agency, Harbour authorities, The National Trust, English Nature, Scottish Natural Heritage, Commoners Associations.
- 1.4 The instructions in the MoD "Notes of Guidance" will be followed, with respect to any human remains and/ or ordnance that may be found during the course of recovery work.
- 1.5 Necessary precautions will be taken to ensure the safety of people working on crash sites. Prevailing best practice and guidelines for health and safety will be observed, particularly with respect to shoring of excavations.

2. Requirements for investigation of aircraft crash sites

- 2.1 Research will be undertaken to try to establish the identity of an aircraft and the circumstances of its loss, before recovery work commences.
- 2.2 An attempt will be made to learn from a crash site as much as reasonably possible in the time available, prior to excavation or the removal of evidence. This will typically include observations of visible damage to trees, hedges, buildings and surface contours as a result of the crash. Where time permits and the direction of impact is not otherwise known, the distribution of any fragments buried or hidden in vegetation around the impact point will be recorded, for example by noting the number of metal detector readings per quadrant. Plotting the distribution of readings in a grid may provide further information in some circumstances. Easily visible surface wreckage will often have been significantly disturbed since the crash, particularly on high ground sites. Where significant disturbance is known to have occurred, a photographic record of the wreckage may be more useful than the distribution of the wreckage.
- 2.3 An attempt will be made to learn from a crash site as much as reasonably possible in the time available, during the course of excavations. Sufficient photographs will be taken to create a record of the relative positions and depths of artefacts that are buried in the ground. Information that can be inferred, such as the direction of impact and inclination to the surface, will be recorded.
- 2.4 Adequate provision on site will be made for the stabilisation of very delicate objects, including documents, fabric, leather, wood and paintwork after recovery from water or waterlogged ground. This may include the use of preservatives and will at least limit damage due to rapid drying or accelerated corrosion
- 2.5 3. Requirements following an excavation or salvage of aircraft remains from a crash site

The following information can be learned from crash sites, depending on the disturbance of the site since the crash, the survival of material and its condition:

- Heading of the aircraft and its inclination to the ground prior to crashing.
- Speed of the aircraft on impact, or the height from which it fell.
- Circumstances of the loss, from gauges and indicators.
- Camouflage scheme/ colours of the aircraft.
- Stencilling and markings of the aircraft.
- Equipment carried by the aircraft, including radio, bombing and navigational equipment, balloon cable cutting devices, survival equipment etc.
- Type of guns and ammunition carried by the aircraft and dates of ammunition.
- Construction and modification standard of the airframe and implied date of loss.
- Modification standard of the cockpit, such as instruments fitted.

- Location(s) where the aircraft was built and inspected.
- Equipment carried or worn by the crew of the aircraft.
- Documentary evidence relevant to the aircraft, crew, mission or unit.
- Information to create or complement period construction drawings, using surviving parts as patterns.

3. Recording

- 3.1 A record of items recovered will be submitted to the BAAC database within one year of recovery. A copy of the form submitted to the PMA is suitable for this purpose.
- 3.2 The specific items recovered from crash sites which may provide evidence of any of the above aspects will be conserved. Sufficient information will be reported to the BAAC to allow others to learn of the existence of evidence, which may be relevant to their area of interest.
- 3.3 Items recovered from crash sites that are to be kept for an extended period will be adequately conserved and labelled, so that the identity of the aircraft is properly recorded. As a minimum, parts will be kept in boxes or bags, which are labelled with the identity of the aircraft. It is recommended that a labelling system that incorporates the aircraft serial number is adopted.
- 3.4 An entry will be made into the National Monument Record database within one year of the completion of site work. This should include the national grid reference of the site, aircraft identity (where known) and location where artefacts and documentary evidence may be made available for research. The location may be a museum or the name of the group if the items have not been deposited with a museum.

4. Site reporting

- 4.1 A report will be produced within three years of completion of work on a site, which includes all information discovered during the course of site work and information gleaned from witnesses and records.
- 4.2 The site report will include a list of items recovered and, where those items may provide any of the information listed in section 3, they will be included in photographs or adequate descriptions in the report.
- 4.3 The recommended headings to be included in a site report are shown in appendix 1.

5. Disposal of items from crash sites

- 5.1 Parts that are contributed to rebuild projects, or otherwise disposed of for display outside the context of the crash site, should be photographed and adequately recorded. The photographs and/ or records should be included in the site report.
- 5.2 Useful stamps (such as inspection stamps), labels and modification plates that are disposed of, other than for display in the context of the crash, should be adequately photographed and/ or recorded. The photographs and/ or records should be included in the site report.
- 5.3 All parts recovered from crash sites will be offered to other BAAC groups through the BAAC exchange system for at least three months prior to being discarded, sold as scrap, smelted or otherwise destroyed.
- 5.4 Recommended best practice is that parts from crash sites should not be disposed of in a way that may encourage others to salvage parts for monetary gain.