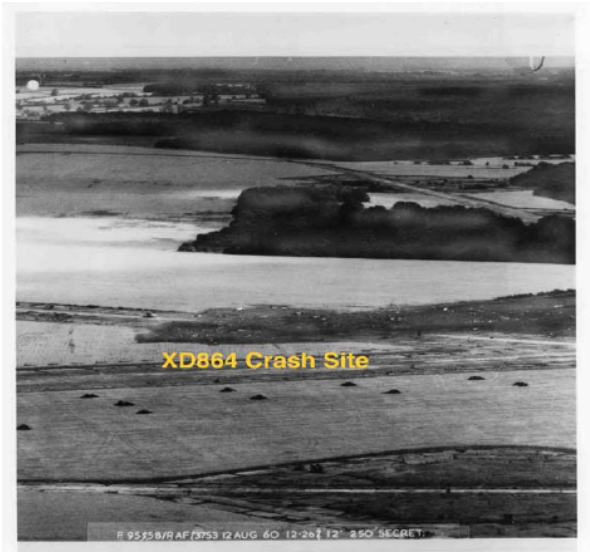
*"ONLY IN CASES IN WHICH THERE IS **ABSOLUTELY NO DOUBT WHATSOEVER** SHOULD DECEASED AIRCREW BE FOUND NEGLIGENT"*

AP3207 – RAF Manual of Flight Safety, Chapter 8, Appendix G, page 9.*

** Link*
http://zkt.blackfish.org.uk/XD864/AP3207.html

The crash of XD864.

Valiant BK1 XD864 crashed on the disused airbase at Spanhoe near Harringworth Northants, with the loss of five crew at 10.38 BST on the 12th of August 1960, three minutes after take off from the V-Bomber base at RAF Wittering, Cambs .



The Board of Inquiry (BoI) into the crash concluded that the accident was caused by pilot error and that the Captain of the Valiant, Flt Lt Brian Wickham, was guilty of "blameworthy negligence". The BoI support this conclusion by using phrases like -

*"The Captain **may** have been approaching an overconfident stage in his flying ..... such an attitude **could** lead to slow reactions in an emergency"*

Here we can already detect some doubt in the use of language by this BoI, the use of "*may*" and "*could*" in the extract above and the dubiousness of the opinion expressed should alert us to the possibility that the conclusions of this BoI are also doubtful, we already have enough doubt in the above extract to break the current Queens Regulation "Absolutely no doubt whatsoever" requirement, but this was 1960 a year in which the RAF lost on average one person a week, killed in a fatal accident or other mishap, an RAF run by WW II heroes, such as Lord Teddar, who's work in the deserts of North Africa during Montgomery's campaign revolutionised close air support, inventing the system that still forms the tactical basis used today.

What follows is a detailed examination of the Board of Inquiry's report into the crash of Valiant XD864, in our examination we see the BoI ignore significant evidence, that of a fractured centre plane spar found at the scene. We see the AAIB inspector declare that he had found "no evidence" of a structural failure prior to impact, he does this without a thorough forensic examination of a fractured spar found at the scene. We see the BoI misrepresent the flight path and edit whole sections of the flight out of their narrative. Later we will create an alternative narrative, based on the same evidence, that does not ignore the fractured spar found at the scene, the purpose is not to prove that XD864's centre plane spar fractured and caused the crash, the purpose is to show that the creation of such a narrative is possible, plausible, believable and evidence based, therefore the BoI should have contemplated the possibility that there was a structural failure prior to impact and investigated the fractured spar. Instead the BoI form their conclusions of pilot error and a stalled turn 3 days into the investigation and chose to ignore the fractured spar.

The Board of Inquiry

"A board of inquiry is a fact-finding assembly primarily concerned with discovering the causes of the accident and, broadly speaking, these fall into three categories: technical faults; natural, operating or medical hazards (NOM); and human failings (human factors)."

You can download the Board of Inquiry and read it for yourself.

Board Of Inquiry - pdf file 20 Mb*

** Link*
http://zkt.blackfish.org.uk/XD864/BoI.pdf

If you don't have time to read the BoI, Michael Bullen and John Dillon have written a web page* that follows the narrative put forward in the BoI. This page also contains some of the errors found in the BoI e.g. "after a standard 30° banked turn of 180°, the aircraft hit the ground". This is not what happened (a 30° bank is the lateral tilt of the A/c in a turn. The 180° refers to the amount turned through) . XD864 actually turned 120º.

** Link*
http://john-dillon.co.uk/V-Force/valiant_xd864.html

Narrative

In the BoI narrative, the accident is caused by the "blameworthy negligence" of the Captain, who it is claimed, allowed his Aircraft (A/c) to enter

a routine 30° banked turn with the engine power set to 6000 revolutions, the A/c stalled in the turn, an attempt was made to recover the stall, but the effort failed and the A/c crashed. The causal chain of events begins with a take off that was too steep at too high a power setting, this necessitated a more severe than normal throttle back at the top of the climb, the nose wheel had failed to retract, this meant the Captain had to keep speed down below limits set out in the Pilots Notes for the A/c. which subsequently led to the turn being entered at too low a power setting. The Captain had also asked for the flaps to be raised as the undercarriage (U/c) was still being retracted. This chain of events was aggravated by "hurried preparations", an "overconfident" Captain and an "inexperienced" Co-pilot. This combination led to "indecision" and "slow reactions". The BoI support their conclusions by gathering data from a flight simulator.

This account of the crash seems at first glance, a plausible explanation of events. It is only with closer scrutiny of the BoI report that this narrative begins to unravel. The BoI narrator uses a framing device of a hurried preparation for the flight made by a slack crew, with an overconfident Captain and an inexperienced Co-pilot. We shall see that all of these premises are more akin to fiction than fact, we will also show not only is this faction supported by scant and questionable evidence, but contains errors and is founded on data collected in a way that is counter to the Scientific Method.

Narrative Techniques

In this section we look at how the BoI construct their narrative, how they frame their narrative, then use flight simulation tests to recreate the stall in the turn hypothesis and from this data tell the story of the flight.

First we'll explore the framing device of a hurried preparation, a slack crew, an "overconfident" Captain and an inexperienced Co-Pilot, it is this element of the BoI narrative that is used to explain how a competent and experienced Captain disastrously failed to complete a routine turn.

Framing device and the Cast of Characters

note: Blue underlined print marked with * are reproduced in the Appendix

The Cast of Characters

Part of the function of Paragraph 8* is to introduce us to the cast of characters in this tragedy. We have the "overconfident" Captain and the novice Co-pilot. with the slack crew. Strange that in an A/c with a crew of five, that all the focus is on two main protagonists, it would appear that the two Navigators and the AEO had nothing to do in the 191 seconds of flight. We are asked to believe that it is this mix of personality types that, according to the BoI, in some way led the Captain to become so distracted that he left the engines at a power setting of 6000 revolutions for over 80 seconds of the flight. and meant that on recovery from a stall in a turn, he delayed increasing engine power for a further 25 seconds before crashing.

Hurried Preparations?

The BoI specifically use one witness to support the claim of hurried preparations for the flight, Witness 18,* There is nothing in Witness 18's statement that indicates a hurried preparation, the crew arrived at the A/c at 08.55 z hours, 40 minutes before the take off, this was normal as the majority of the checks had been carried out the previous night, and the Captain completed the external checks (without a check list and with the omission of two checks) in the presence of senior ground crew and climbed aboard the A/c which began taxiing for take off at 09.20 'Z' hours.

The second plank in the hurried preparations framing device is a phone call made by the Captain between 08.00 and 08.15 'Z' hours to secure the services of a co-pilot. The co-pilot was needed because the usual co-pilot was away in Malta picking up another Valiant and was delayed for 2 days. He arrived back in the U.K. later the same day (12th August), He had left for Malta three or four days before, which would suggest that the RAF and the Captain knew that there was a need for a co-pilot well in advance. So why was it necessary for the Captain to request a replacement? and why at such short notice? Had the RAF no idea of contingency and standby crew?. We also find in the evidence of the meteorological officers statement* that the **Captain and crew were present at the 07.30 'Z' hours** met briefing, suggesting that the 5 crew were assembled at this time. This then makes the eight o'clock call for a co-pilot look like a confirmation that the Captain could take a co-pilot that either was arranged for him by the Chain of Command, or had been informally negotiated at the met briefing, either way **the crew was fully constituted in time for the briefing that ended at 08.30 'Z' hours**, **a full hour and five minutes before take off**.

It is questionable of the BoI to suppose that it was the Captain's responsibility to find a replacement for the co-pilot at the last minute. The Captain hadn't ordered the usual co-pilot to fly to Malta, that order came from Wing Commander B.P.Mugford OC 7 Squadron it was incumbent upon him to ensure that the Captain had a fully constituted crew for the flight. No effort is made by the BoI to find out why it was the Captain's responsibility to find a co-pilot at the last minute, though Mugford was interviewed twice by the Board. The 'hurry' in finding a co-pilot is given as a contributing factor to the crash in the BoI, but the BoI make no Inquiry into how this potential hazard to flying came about nor do they make any recommendations to stop this happening again in the future.

Slack Crew?

In this the second element of the framing device, we look again at paragraph 8* of the BoI, The attitude of the crew to flying - here we find one minor misdemeanour, by one of the crew. Nevertheless we are left with the impression of a slack crew, if this crew was slack so were most of the experienced crews in the RAF some of whom found the helmets got in the way of their work. A great deal of attention is given to the Nav/plotter not having a helmet, two witnesses are called to make sworn statements about the helmet situation, even though the BoI admit that this had absolutely no causal connection with the crash. This evidence supports the contention that the BoI were too concerned with evidence in support of the causal category, Human error, which is further highlighted by the total lack of an investigation into a fractured centre-plane spar found at the scene and the BoI's failure to note other departures from SOP, such as flying on a further 3.75 nm up the Welland Valley before performing a turn without contacting Air Traffic Control (ATC).

"Overconfident" Captain who "thought he knew more and better than the most pilots "

The Captain is characterised, in other words he is cocky and riding for a fall, no witness statement supports the contention that the Captain was "over confident" and "thought he knew more and better than most pilots", instead it is his actions that are used as supporting evidence. He allowed one of his crew to fly without a helmet. He completed the checks in the presence of senior ground crew, without a check list, omitting

two minor checks and he allowed the flaps to be retracted before an indication that the U/c was fully retracted, therefore the BoI conclude, he may have been overconfident.

Using the above to support the contention that the Captain was "overconfident" means that most experienced Captains in the RAF at that time, could have been accused of the same thing. The contention is also contradicted in the sworn statement of 7 Squadron's Commanding Officer (BoI pp 27) and the evidence of the Captain's flying record.
It is stated in paragraph 8 that allowing an "untried copilot to take off .... is at least unwise". Here with the benefit of 20-20 hind sight the BoI judge it to be "unwise", but there is at least one good reason to let the "untried" co-pilot take-off.
He was the more experienced pilot in terms of familiarity with Wittering as the Captain's Squadron had not been issued with order books for Wittering.

Inexperienced Co-Pilot

The Co-Pilot had been at Wittering since April 1960, The Captain on the other hand had been at Wittering for around three weeks and had not been issued with an order book for Wittering, which makes the co-pilot the more experienced pilot from the point of view of familiarity with the Standard Procedures in operation at Wittering. The word Co-Pilot is often accompanied by the words "untried" or "inexperienced", this is supported in the evidence of his Squadron's Commanding Officer, where the CO had asked for reports on the progress of the co-pilot from the co-pilot's usual Captain. When asked in 2008 if this was true the co-pilots usual Captain was bemused. There is anecdotal evidence to suggest that the Co-pilot was in-fact a very good pilot, his usual Captain said, again in 2008:- *"he was the best co-pilot I had flown with"* and *"he would have made a good Captain"*, it has also been reported that the Co-pilot won a commendation on completion of his pilots training (further research is being undertaken to confirm)

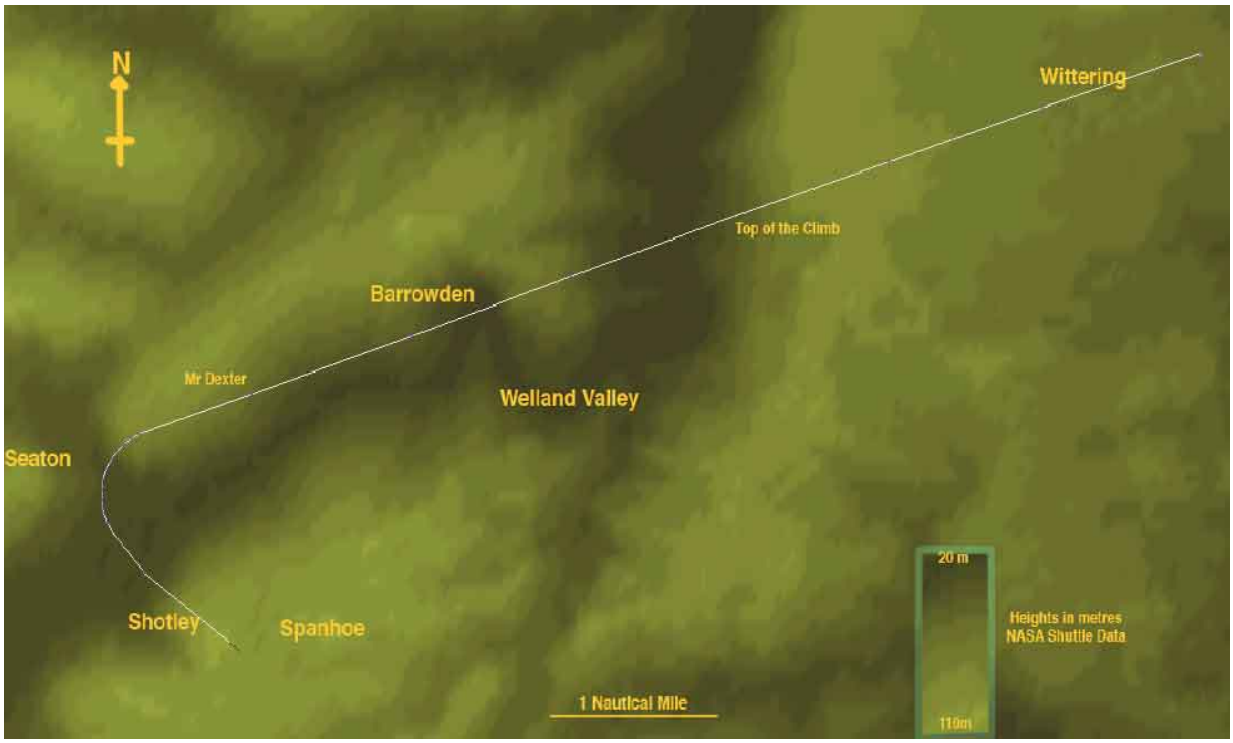
The Construction of the Narrative

It would be instructive here to look at the reconstruction of the flight, though this might be out of sequence with the work of the BoI, who first ran the simulations for two days (15th & 16th) before reconstructing the flight on the morning of the 17th, as is shown in the Diary of Action page 111 items 64 and 72, and Page 112 item 78 of the report, but told the other way in paragraphs 4 and 5 of the report (more internal inconsistency). As we shall see later in the section on the flight simulation tests, (they were carried out with only one of the causal categories considered, undertaken to prove a single hypothesis) the BoI began their simulations on the 15th, only three days after the crash, we must conclude therefore that the BoI had more or less made their minds up about the cause of the accident at this time.

The Reconstruction of the Flight

Although certain parts of Appendix T are now missing it is possible to recreate the flight path in the same way the BoI do, using witness statements, and plotting the results on an OS map of the area.

Here is a reconstruction showing the topography using NASA elevation data.



Reconstruction of the flight Path PDF *

** PDF Not included - available at http://zkt.blackfish.org.uk/XD864/FlightProfiles.pdf*

Here are two mp4 movies made from these data. (Right Click and download - as most browsers don't know what to do with mp4 files)

From the Cockpit *
Witness 5 *

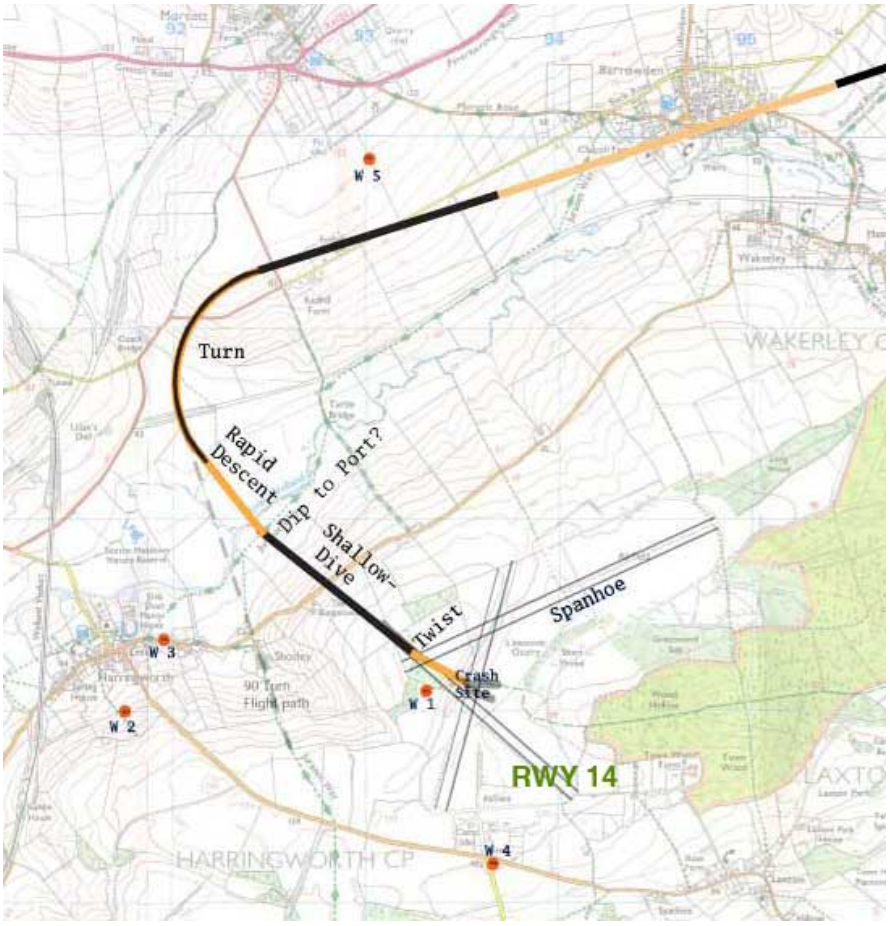
** Video Links*
http://zkt.blackfish.org.uk/XD864/Cockpit.mp4
http://zkt.blackfish.org.uk/XD864/W5_50mm.mp4

and this higher quality avi
Witness 3 *

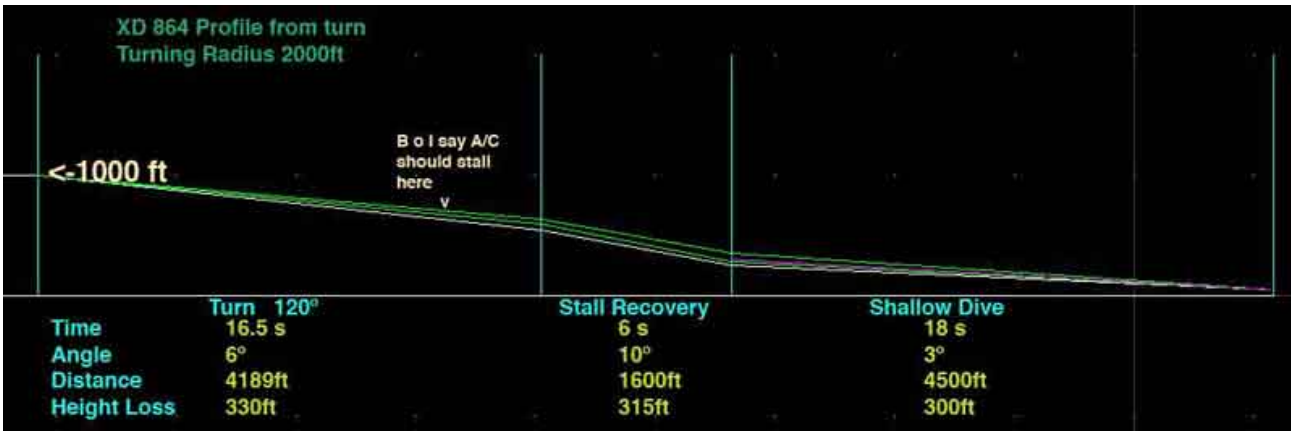
http://zkt.blackfish.org.uk/XD864/W3_4067_4761.avi

It should be noted here that it is more likely that the Events Diary account of the sequence; simulator then reconstruction, is more accurate,

because at first glance the reconstruction throws up another possible narrative, that of an attempt by the Captain to perform an emergency landing on the disused runway 14 at Spanhoe,



The A/c stalled out of a turn in line with a runway and had lost enough height so that, with a stall recovery (rapid descent) and a final adjustment of course, ended up in an 18 second slow, shallow descent, in line with a runway, with the engines idling, in other words what you do in a glide approach to a landing.



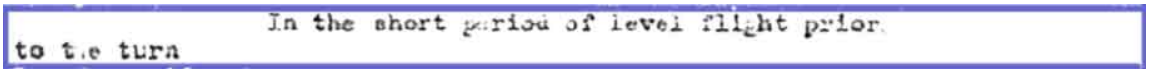
So had the BoI reconstructed the flight path before running the simulations, they should surely have explored this other possible narrative, an attempted landing, in the simulations they intended to run. We will return to this other possible narrative later on, but for now we will continue with our look at the construction of BoI's narrative.....

The chain of events.

Having framed their narrative in the way we've explored above the BoI then turn their attention to telling us the chain of events that led to the crash. Here we see the Board ignore inconvenient evidence, carry out flight simulator tests that do not meet the required standard for the Scientific Method and play with our perception of time.

Timeline editing

In the BoI's description of the chain of events very imprecise language is used to describe times in the flight. For example, here are the only two descriptions of the length of time taken from the top of the climb (about 72 secs into the flight) to the initiation of the turn, given in the report.


In the short period of level flight prior to the turn

and

stable level flight was achieved for a very short time.

This "very short time" can be calculated using the estimated distance and the estimated average speed for the flight, for example at 160K over 3.75nm gives a time of 84.375 seconds, nearly a minute and a half, slightly longer than the amount of time taken to take off and climb to 1800 ft (72 secs), does this mean that the A/c took off in an even shorter period of time than the "very short time" of "stable level flight"?. The use of imprecise language here means we insert whatever we think of as a "very short time", in the context of a flight that lasted approximately three minutes, it becomes an even shorter period of time in our minds, but in reality represents almost half of the flight. Further we are asked to believe that no further notice was taken by Pilots or Navigators or the AEO to the low engine power selected at the top of the climb until the A/c is just about to crash nearly two minutes later, having turned through 120°. There is more about this in the discussion of Witness 5's evidence later.

This editing is also seen in the description of the flight in Para 1 of the BoI.

The aircraft climbed rather steeply and levelled out approximately at circuit height. At about six nautical miles from the airfield the aircraft

.....

started a normal turn to the left.

Here nothing appears to happen in the flight between levelling off and starting the turn, nothing happens for over a third of the flight.

This cut in the time line could represent around 60-80 seconds in the flight. Using a distance (6nm) here means we have to do a calculation in order to work out the time taken, first we must subtract 3nm (distance at the top of the climb) from the 6nm given, and then divide that number by an average speed, we must then multiply that result by 60 twice in order to get a time in seconds. Rather than doing this calculation we just take the imprecise "very short period" and equate that with the inaccurate 6nm. According to the BoI, contributing factors to the accident, are "slow reactions" and "indecision" which are related to time and not distance. Using a distance and not a time stops us from asking. What were they doing all that time? Why didn't they lower the flaps? Why didn't the crew notice the low power setting? Why did they turn where they did?

Having framed their narrative with "hurried preparations" which has the effect of further shortening our perception of exactly how long this "very short time" was, the BoI have set up the basic premises of their theory, the Board then arrange for a set of flight simulation tests, though the Board clearly state that they don't know who was actually flying the A/c at any time during the flight, they choose "an inexperienced co-pilot" and not an "overconfident Captain" to fly in the simulator, the role of the Captain was taken by a fully briefed Instructor.

It should be pointed out here, that though Mr Clarke (AAIB) reported that no technical problems had been found does not mean that there was no technical failure, other than the nose wheel's failure to retract, there is other evidence that suggests that there may have been a serious technical failure in the aircraft, not least of which is the fractured centre-plane spar found at the scene which was not investigated. Was G (2) on this telegram (below) sent from Wittering at around 1300 hrs 'Z', a reference to the Spar?, clearly 'UNUSUAL OR OBSCURE FEATURES OF A TECHNICAL NATURE" does not refer to the 'NOSE WHEEL FAILURE' mentioned in F(1).

(F) (1) NOSE WHEEL FAILED TO RETRACT PD ACCIDENT OCCURRED WHILE CAPTAIN INVESTIGATED NOSE WHEEL FAILURE IN LOCAL AREA PD IN FLIGHT PD THREE MINUTES AFTER TAKE OFF PD
(2) CAUSE UNKNOWN
(G) (1) YES (2) UNUSUAL OR OBSCURE FEATURES OF A TECHNICAL NATURE
(H) (1) MAJOR CRASH CAT 5 (2) YES (3) NO

Mr Clarke AAIB reports no UNUSUAL OR OBSCURE FEATURES in his final report other than perhaps the fractured spar which is mentioned once and was not examined by him. It may have been Mr Clarke's neglegence that led the BoI to forget their duty to continue looking at all the evidence for all the causal categories, instead almost the entire focus of the BoI is on the dead crew. If in the course of their investigation some other evidence not connected with the technical report, such as an eye-witness account or a reconstruction of the flight, or a fractured spar, showed that there was a possibility that the AIB report might be wrong then, the BoI have a duty to investigate and not ignore that evidence They must show evidence of that investigation and the reasons for rejecting other possible and plausible hypotheses for the cause of the A/c loss, no such record is available in the report.

The Flight Simulation Tests

The flight simulation tests are carried out with only one of the causal categories in mind, that of Human error, and with only one hypothesis, that of a stalled turn . It seems from the Dairy of events that this cause and hypothesis had been decided on only three days after the crash, but as we have and shall see, there is evidence that supports the other possible narrative, an emergency landing attempt which the BoI chose to ignore or were oblivious to.

The Stall in the turn hypothesis

It is clear from Pilots Notes (P/n) that the Valiant was extremely difficult to stall in a turn and that the A/c would itself roll out of a stall in the turn without the intervention of the pilot. There is a warning buffet of a stall 12K above the stalling speed with the A/c in clean condition (flaps up) in level flight (P/n IV 11 Stalling (c)) - the state of the U/c has "no effect on the stall" (P/n IV 11 Stalling (d)). Here are paragraphs (e) and (f) from section IV "Handling". 11 Stalling, from Valiant "Pilots Notes"

(*e*) *Stalling in turns.* If the aircraft is stalled during turns it will almost invariably roll out of the turn, and recover when the back pressure on the stick is released. Occasionally an aircraft will roll into the turn when stalled, but this is most likely to happen when the turn is being done at a very low speed. Recovery action as in (*c*) above is effective. The stall warning buffet occurs only a few knots above the stall and, again, flaps have the effect of reducing the stall warning.

(*f*) *Inadvertent stalling.* Inadvertent stalling is very unlikely to occur, since from straight and level flight the stalling attitude will be pronounced nose-up, which should be readily detected by one or other of the pilots on either the natural or the artificial horizon. In turning flight, considerable G will be required to stall the aeroplane unless the pilot is lax enough to have a very large angle of bank with little forward speed.

So why do the Board say the Captain would order the co-pilot to "come out of the turn"?, if the A/c would "almost invariably roll out of the turn", additionally why would the Captain have to "grab the controls" and suppress the "automatic reflex" to pull back? if there was a warning of a stall (see the extract below). The "delay" in the last sentence of the BoI narrative (below) is, from the flight reconstruction, over 20 seconds long (longer if the A/c was close to stalling). We are asked to believe that the crew were undecided as to who was in charge for this length of time or that the "reactions" of the co-pilot were so slow as to be three orders of magnitude larger than periods normally associated with human reaction times.

As the aircraft turned it would lose speed and height until it reached the stalling speed of 137 K. after about.. 90° of turn. The unsteadiness of the aircraft would then attract the Captain's attention and he would doubtless order the co-pilot to come out of the turn, or take control himself. Realising the seriousness of his position he would grab the controls. The automatic reflex action to pull back could stall the aircraft and normal stall recovery action would have to be taken. The call for extra power may well have been delayed or the opening of the throttles delayed, either by indecision as to who was in control, or by the slow reactions of the co-pilot.

Anecdotally the Valiant was "majestic" in the stall according to one Boscombe Down test pilot. We have to ask, how likely is it that XD864 stalled in the turn? as the BoI claim, from the reading of pilots notes we have to conclude that inadvertently stalling the Valiant in a turn is "very unlikely" particularly by an experienced pilot. The mention here of "automatic reflex action" is superfluous to the narrative, it is used to further the Board's fiction of "hurried preparation", "very short" periods of time, the "grabbing" of controls and the "slow reactions" caused by the extremes of "confidence" allegedly manifest by both pilots. Surely a structural failure in an aircraft built to the 'safe-life' strategy made from a material DTD683, that was known to fail catestrophically is the more likely scenario. The fractured spar (the main structural component of an A/c built to 'safe-life', 'safe-life' could not ensure safety in a catestrophic failure) should surely have been the initial focus of the investigation.

Paragraph Five (The Simulator Tests)

Five sentences. Three errors. One law of physics ignored. two eye-witnesses ignored and some pathological Science thrown in.
In the first sentence of paragraph 5* The BoI fail to note the dip to port during a steeper than normal take off, reported by two eye-witness. There is a plausible and possible alternative explanation of a rapid steep ascent, which is an emergency ascent to gain height, to gain time to asses a potentially more serious problem than a stuck front wheel, to give an opportunity to dump fuel, and increase the chances of survival for the rear crew should they need to abandon the A/c. The steep ascent is the causal starting point in the BoI's chain of events, they don't investigate the cause of the steep ascent or whether the dip to port was somehow causally connected with the steep ascent.

Also in the first sentence in paragraph 5. we find our **first error** made by the BoI. We are told that the Captain was trying to keep his speed below **170K. which is the limit for lowering the U/c**. This is an error because the assumption is that, the Captain planned to lower the U/c next , but this assumption ignores the fact that **the Captain could fly the A/c with the nose wheel locked down at a speed of 195K** and delay lowering the U/c and that this speed (195K) is therefore the upper limit. This first error, confirmed in the remarks of the Station Commander (BoI pp 11-12) and in Pilots Notes (below),

(d) *Maximum speeds*

For lowering the undercarriage	170 knots
For flying with undercarriage down	195 knots
For raising the undercarriage	195 knots
Flaps down to 20 degrees	190 knots
Flaps down 20 to 58 degrees	150 knots
Air brakes out	No Limitation

leads on to our **second error**.
In sentence two - the figure of **6000 revs,** given as the result of the tests for the engine power setting on entering the turn, is therefore **not correct**, the figure is too low because of the error in upper speed limit (195K not 170K) the revs could have been set higher.
In the third sentence of paragraph 5 we come to our **third error**, the degree of turn the A/c **stalls** at is given as "**by the time the A/c had turned through 90°"**. This third error created by the first and second errors and confirmed as an error by the reconstruction of the flight, which shows **the A/c must have turned through at least 120°** to crash where it did, travelling in the direction it was travelling in.
Sentence four **ignores the Laws of Physics** of bodies falling under gravity, i .e. the "downward inertia" also has the positive effect of increasing the speed, which is how a stall is recovered. We have estimated an increase of 20K. in the rapid descent phase of the flight, which would have been enough to recover a stall.
And so to the final sentence of paragraph 5. They conclude that their tests are "too closely similar to observed behaviour of the A/c to be ignored".
So how is a 90° turn "too closely similar" to a 120° turn "to be ignored"? It is certain that as the A/c turns through 120°, the result of 6000 revs must be an error. Shouldn't the tests have been run again?.

Appendix C* contains the record of the tests carried out on the 16th.

From the way these test were run it would have made no difference to the results if the BoI had flown them themselves, because they basically order the "relatively inexperienced co-pilot" to stall the Valiant in the turn. This is an example of Pathological Science, because they start with their conclusion, and create the evidence to support their conclusion, that the pilot stalled the A/c in a turn, by running the simulator until the co-pilot stalls the a/c in the turn. There is no mystery about how you stall a Valiant in a turn you just enter it at too low speed and power, and the laws of physics do the rest. In paragraph 1 Appendix C, Introduction, the BoI state that they are running the tests "*to reproduce the circumstances of the flight under investigation"*, they started the tests 3 days after the accident, in the tests they try to get the co-pilot to stall in the turn, testing their single hypothesis, so they can gather their "data", in other words they already thought they knew "*the circumstances of the flight under investigation*" 3 days after the crash, maybe this is why they neglected to investigate the fractured spar found at the scene ;-D.

Four simulator tests are recorded. In all of the tests it is unclear whether the turn is initiated at 6nm down range, which was the stated aim, instead the turns are started as soon as stable flight is achieved, in a similar fashion to the shortening of the time line we have seen elsewhere in the BoI report, are we to assume that stable and level flight was achieved at exactly 6nm, in every test? From the reconstruction of the flight the A/c flew on to 6.75 nm before turning a difference of about an extra 15 seconds at 160K in the flight time . We are left wondering if leaving the engines at a power setting of 6000 revolutions for over 80 seconds would cause the A/c to stall before the turn.
Because the Board make an assumption that the pilot intended to lower the U/c next, the upper speed limit in the Simulator tests is wrongly kept to below 170K (the upper limit is 195K) and the amount of turn before the stall is said to be 90° and not the actual 120°, these two compounded errors compromise the validity of the data gained from the tests, and makes any conclusions drawn from these data likely to be of little or no value. The BoI fail in their stated aim of "reproducing the circumstances of the flight".

One item of data of value however did turn up in the first test, which is what the un-briefed comparatively inexperienced co-pilot did when reacting to the nose wheel malfunction. He decreased power and climb rate which is the exact opposite of what was observed in the flight, where climb rate and power were increased, What the co-pilot did in the simulator was the right thing to do in those circumstances, the BoI reject this data because "the pilot did not conform to the steep climb pattern required", this is an example of pathological science, in other words because the experiment did not produce the data they were looking for, all the data is rejected, it is rejected because the BoI assumes that the "steep climb pattern" was an error or quirk on the part of the pilot, but as we have seen above, there is another plausible and possible explanation, that an emergency occurred and the pilot was attempting to quickly gain height, i.e. the dip to port on take off was part of a causal chain that caused the pilot to initiate a rapid ascent.

And finally.....
To the "Discussion of the results of the tests"
Appendix C - 16.

Discussion of Results of Tests

16. The test were designed to reproduce observed patterns disclosed by the evidence of witnesses as follows:-

(a) Steeper than normal climb from take-off. (7th, 17th 18th Witnesses)

(b) Irregular engine noise when levelled out.
(This is characteristic of closing the throttles) (5th Witness)

(c) Engines at low power in and after turn. (2nd, 3rd Witnesses)

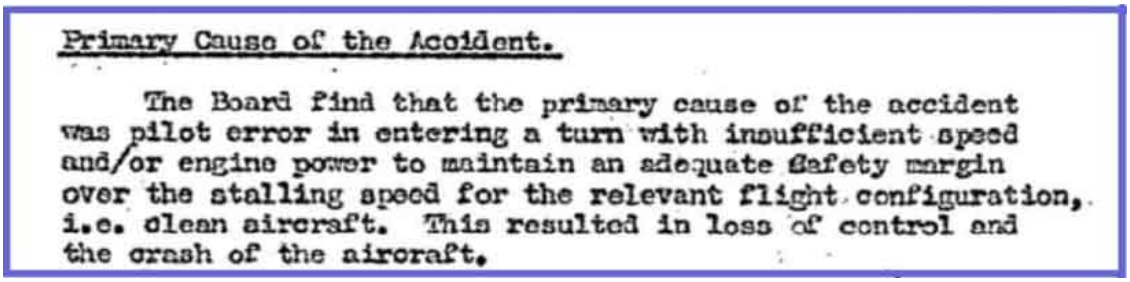
(d) Loss of height and instability in recovery from turn. (2nd Witness)

(e) Shallow dive and increase in power. (2nd Witness)

a) The test did not "reproduce" this (the pilot was re briefed). In the first un-briefed test the opposite was observed, this should have raised questions.
b) There is some doubt whether Witness 5 was hearing the deceleration when levelling out, he describes the A/c as being "lower than" normal which is not what you'd expect from an A/c levelling out at the top of the climb.(More on this in para 9 section below)
c) Here the BoI equate quietness with low power, quietness may also be attributable to the direction and orientation of the source, as well as wind conditions and topographic features. Ignores the plausible possibility of a deliberate idling of the engines to minimise forward speed characteristic of a glide approach and landing attempt.
d) The use of the phrase "recovery from the turn" is indicative of the investigative bias towards a stall hypothesis. Usually A/c don't "recover" from turns. The instability in the flight may be attributable to other causes such as a spar failure, which was not adequately investigated and the loss of height may have been deliberate as in a landing attempt.
e) The tests did not "reproduce" this. (The simulator could not simulate a stall) and therefore this 'observed pattern' could never be reproduced and the same applies to (d) above if, as the BoI speculate the A/c stalled in the turn.

The BoI failed on all five counts to "reproduce the observed patterns disclosed" and it was impossible to 'reproduce' the last two 'observed patterns' d and e above.

The evidence of Witness One is ignored - slowly "flying in line with the runway" and sliding into the ground. None of the witnesses say the A/c stalled in the turn, they all say the turn was 'normal'
The dip to port on take off is given no significance.
These tests do not rule out the attempted landing theory and do not prove the "unlikely" stall in the turn hypothesis, because there are errors in the data it follows from the Scientific Method that the conclusions are also flawed, untrustworthy and cannot be used as the basis for the narrative of the flight or for the conclusion of the Primary Cause of the Accident.



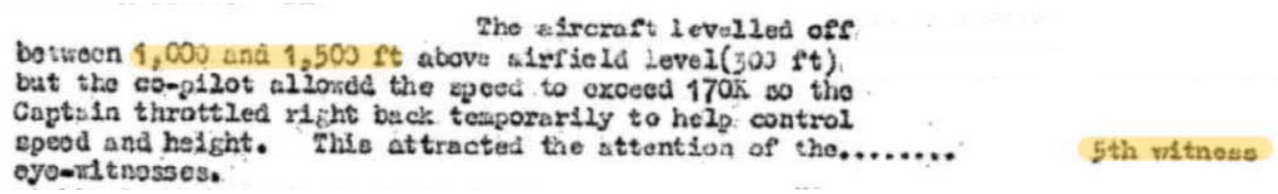
Primary Cause of the Accident.

The Board find that the primary cause of the accident was pilot error in entering a turn with insufficient speed and/or engine power to maintain an adequate safety margin over the stalling speed for the relevant flight configuration, i.e. clean aircraft. This resulted in loss of control and the crash of the aircraft.

The above paragraph from the BoI is entirely based on the flight simulation data, which as we have seen, is Scientifically untrustworthy in other words, this is what they made the inexperienced co-pilot do in the simulator and as we have seen tells us nothing about what happened in the flight.

Paragraph 9 "Reconstruction of the Accident"

Paragraph 9 is where the BoI bring together the threads of their narrative. Here is the Board's Reconstruction of the Accident* we have highlighted various statements that are dubious for the reasons we have so far discussed.
Here's an example of a dubious statement, the levelling off figures "1000 and 1500 ft ". We'll also examine the use of Witness 5's Statement.



The aircraft levelled off between 1,000 and 1,500 ft above airfield level(300 ft) but the co-pilot allowdd the speed to exceed 170K so the Captain throttled right back temporarily to help control speed and height. This attracted the attention of the..... 5th witness eye-witnesses.

"1000 and 1500 ft "? another example of internal inconsistency.

Witness 17 states ...

"... it levelled out at what I thought was 2000ft"

both Witness 6 and 7 say *"1800ft QNH"*

In the opening section "A brief description of the Accident" BoI page 1, they say....

".. approximately circuit height" (1800 QNH)

Where does the 1000ft figure come from?

Witness 5's Statement

In the extract above the BoI use Mr Dexter's (Witness 5) statement to support the contention that a radical change was made to the engine power by the Captain as he "throttled right back" at the top of the climb. The implication is that it was the engine sound that "attracted" Mr Dexter, but you can read in Mr Dexter's statement that he saw the A/c first and continued watching its progress because of the engine sound.

Here is Mr Dexter's Statement

CONFIDENTIAL Page 17

5 Certified True copy (OCR)....

5th Witness

Mr. GEORGE DEXTER (43) farmer, of REDHILL COTTAGE, OAKHAM, RUTLAND, being duly sworn, states:

"At approximately 10.45 a.m. on the 12th August,1960 I was working in a field on the north rise of the WELLAND valley to the west of BARROWEN village. ***I saw a VALIANT aircraft flying along the valley towards the WELLAND viaduct at SEATON***. I paid particular attention to it because the ***engine noise was not as regular as usual.*** The ***aircraft was flying at a height somewhat lower than those which climb straight ahead from WITTERING*** but not unduly low to be disturbing. As the aircraft got close to the viaduct it turned in a normal manner to the left. I took my eyes off the aircraft for a short time and when I looked again it was in a steep bank to the left and losing height rapidly. It appeared to twist over and dived towards the ground and a fraction of a second later I saw a terrific sheet of flame and a large cloud of smoke."

signed G. DEXTER

Mr Dexter's evidence is used by the BoI as a narrative device, in cinematic terms this is a jump cut, a device used in editing to increase the pace of the action, like a skipped heart beat. In this case the action moves from the top of the climb (associated with the engine noise) to Mr Dexter's location, "close to the viaduct". In reality this heart beat is between 60 and 90 seconds, a distance of 3.75nm. Here, again we see the BoI avoiding having to answer some awkward questions, such as why didn't they lower the flaps?, simply by removing this phase of the flight from the narrative, by editing it out.

" ***I saw a VALIANT aircraft flying along the valley towards the WELLAND viaduct at SEATON ... [at] a height somewhat lower "***

In his statement, Mr Dexter identifies the type of A/c first "a Valiant" he then identifies its course "along the valley" and then its future location "SEATON". Mr Dexter's attention is then drawn to the engine sound and finally Mr Dexter notes its height.

If as the BoI maintain, Mr Dexter first saw the A/c around the top of the climb, the A/c would have been approaching Mr Dexter from the direction of the morning Sun, visually it would have appeared as a small speck against a bright sky. It would have taken approximately 16 seconds for the sound of the engines at the top of the climb to reach Mr Dexter's location.

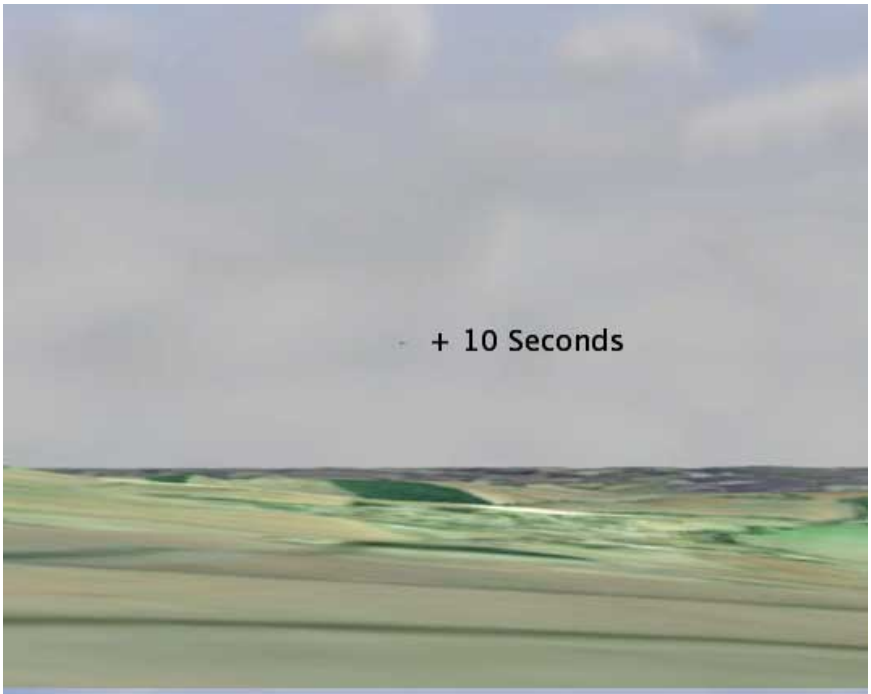
Here (below) is what Mr Dexter would have seen when the BoI say Mr Dexter heard the irregular engine sound, (around 16 seconds from the top of the climb). The A/c is a speck above the lower left corner of the wooded area in the centre of the image, the A/c is flying **across** the Welland Valley at this point in the flight and not along the valley as Mr Dexter states.

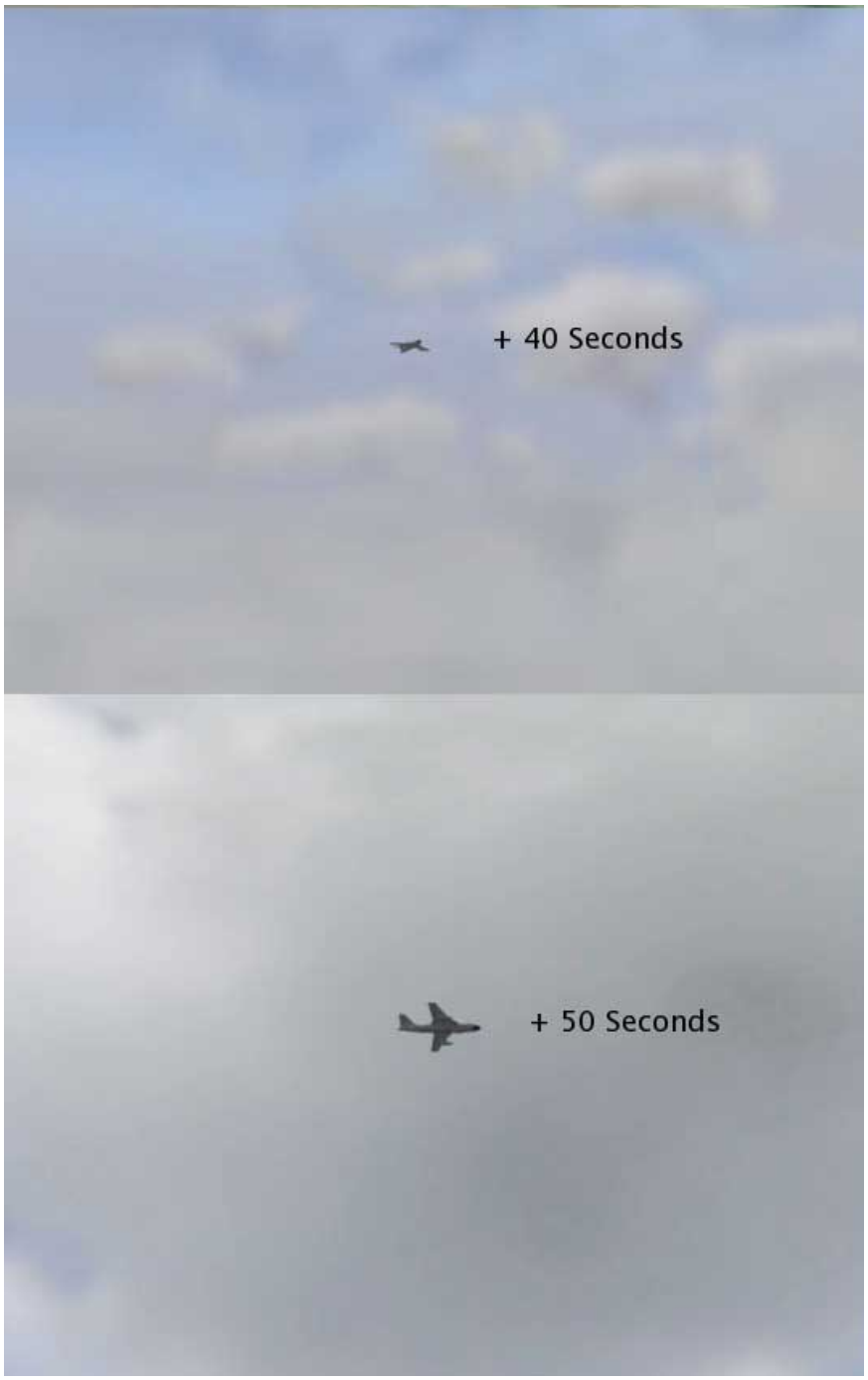
It is impossible to identify the type of this A/c, and it appears to be slowly climbing towards the top right hand corner of the image, making the

determination of course and eventual destination impossible also.

Here (below) is what Mr Dexter would have seen at intervals of 10 seconds for the next 50 seconds starting at the top of the climb. This sequence is taken from a Hi- resolution version of the movie Witness 5.mp4.* This is the phase of the flight edited out of the BoI narrative, described by the BoI as a "short period" of level flight that took a "very short time", the time line edit begins after the top of the climb ...

** Video Link*





and ends here, approximately 60 seconds later entering the turn, at the end of the "short period" of level flight..

Viewing the above image sequence, it's apparent that the direction of the A/c is only discernible by about +20 seconds, that it is flying along the

Valley by +30 seconds, its height by about +40 seconds and its type a few seconds later. The only time therefore that Mr Dexter could possibly make the statement:-

" ***I saw a VALIANT aircraft flying along the valley towards the WELLAND viaduct at SEATON"***

Is when the A/c was further on down the track some 50 seconds after the A/c had reached the top of the climb about 20 seconds from turning.

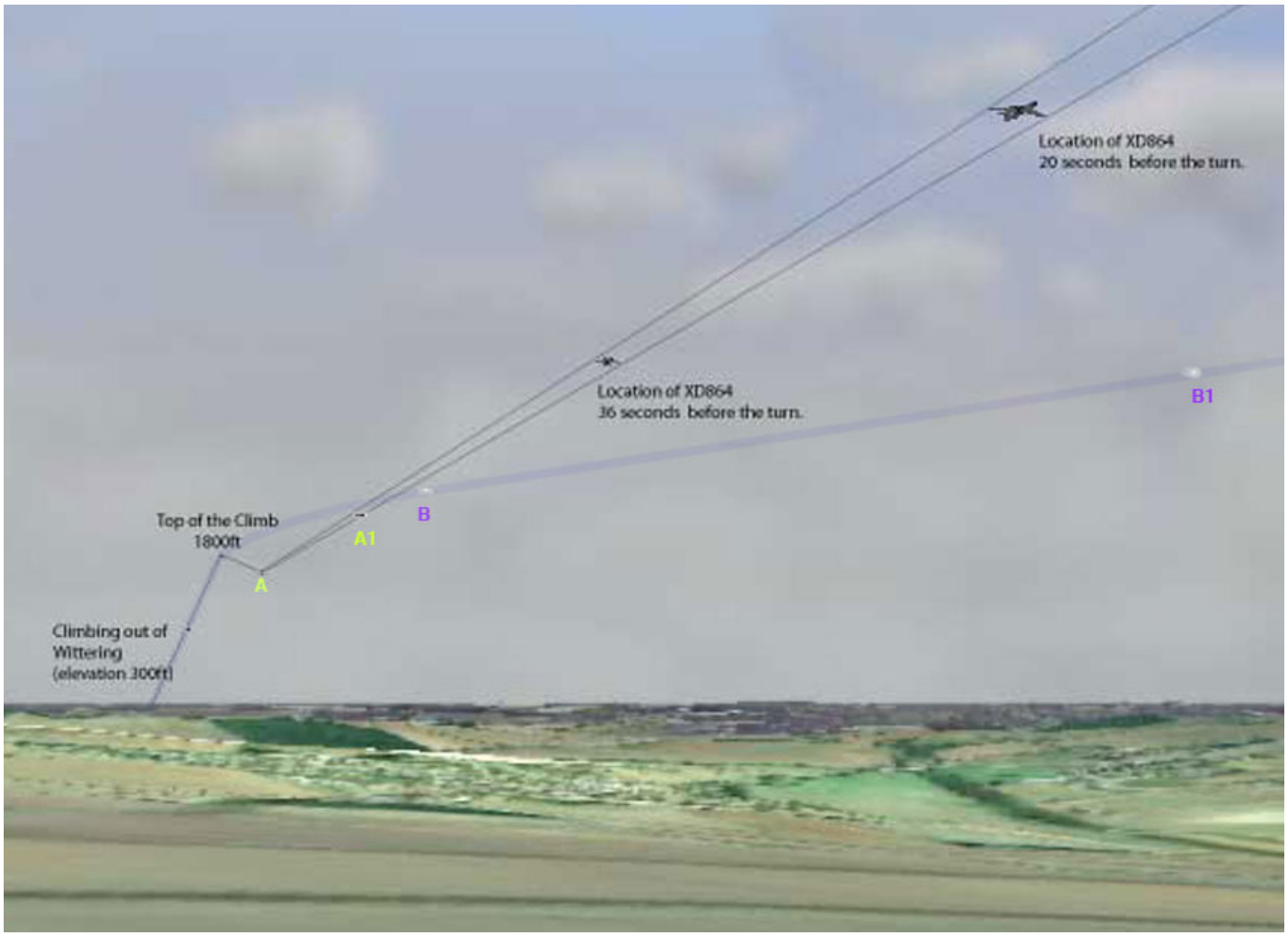
Mr Dexter clearly identifies the A/c as a "Valiant", and it is known that the engines only took at most a couple of seconds to settle down. It is therefore very much more probable that the irregular sound of the engines noticed by Mr Dexter was the A/c decelerating in readiness for the turn (not at the top of the climb as the BoI state), which would suggest that the pilot was aware of A/c speed entering the turn and in control of the A/c.

"The aircraft was flying at a height
somewhat lower than those which climb straight ahead from
WITTERING"

The A/c which "climb straight ahead" were A/c that were taking off from RWY 26 and heading West out of the Wittering area - Those that were heading East (like XD864 was supposed to on this flight) would turn to port at the top of the climb, maintaining altitude through a 190° turn, to get onto the track 072T, moving away from Mr Dexter. The Westerly bound A/c would turn 40° to the South at the top of the climb onto track 222T, climbing a further 250 ft. They would be using the radio to get permission to cross the Amber 2 skyway some 25 nm down range at an altitude of 17,000 feet, if they could not obtain permission to cross, then they would circuit the Wittering area until their route was clear.

The tracks, reproduced in the image below, are from the point of view of Mr Dexter. The track of XD864 ("A") is contained within the black lines, the track of a West bound A/c is the blue line ("B"). For the take off and climb to 1800 ft the flight paths are shared. The points "A" and "B" are where the A/c would be on their respective flight paths at the time the irregular engine sound attributable, according to the BoI, to the throttle back at the top of the climb, would reach Mr Dexter's location (16 seconds delay in sound reaching Mr D). Points "A1" and "B1" are where the A/c would be some 16 seconds later (48 seconds before the turn in the case of A/c at position "A1").

Flight path projection from Witness 5's point of view showing flightpaths of West bound A/c and XD864 (Based on BoI pp 60-63 and the reconstruction of the flight)



Again it is clear that Mr Dexter first notices XD864 very much later in the flight than the BoI say Mr Dexter first sees the A/c. It would be impossible for an observer at Mr Dexter's location to decide which flight path an A/c at position "A" was following, but the BoI assume Mr Dexter somehow managed to do this, i.e. with the A/c 16 seconds from the top of the climb, it is very easy to confuse whether an A/c is climbing on T/o or heading East, West or "along" the Valley. The height of the A/c can only be resolved when the A/c has travelled at least another 30 or so seconds in the flight (36 seconds before the turn in the image above). Again this evidence supports the contention that the pilot was decelerating in readiness for a turn when Mr Dexter first notices the A/c and so in control of the A/c, selecting a power setting appropriate for the manoeuvre he was about to carry out, i.e. a 'normal' turn.

There are other errors contained in the BoI report, that is this examination does not include these other errors as they are mostly quite minor, but show that the performance of both the AAIB and the BoI are open to question, e.g. the AAIB inspector states twice that XD864 was heading of 44º when it hit the ground it was in fact 140º. The BoI calculate the average speed of the A/c over the course of the flight as 160 mph ~130K, when in fact the average speed was between 160K and 180K.

Discussion

In an effort to explain how a competent and experienced RAF trained Captain (In over 3,600 hours flying, he had survived a window blow out at high altitude and an engine re-light failure both in Valiants in which, he had flown over 800 hours as a first pilot) could have possibly become so lax as to let his A/c inadvertently stall in a routine manoeuvre, the BoI have to make the sequence of events leading up to the crash seem to happen very quickly, too quickly for the over confident Captain and his inexperienced co-pilot, hampered by their indecision and slow reactions, to have time to do anything about the power setting selected at the top of the climb until moments before impact, when the pilots suddenly wake up to their predicament and finally increase engine power. The BoI achieve this compression of time by several and various means, so that any reader of this report thinks that more or less straight after the top of the climb is reached the A/c begins a turn to port, after a non specific "very short period" of level flight, and after 90° of that turn, stalls, crashing into the ground very shortly afterwards.

Why then do the BoI play this game with our perception of time?, there are possibly two reasons.

Firstly, there is no need to explain the apparent total lack of action during the 70 second (or so) stable and level phase of the flight.

Secondly, for answering awkward questions, with the convenient answer....

"There was no time".

Why didn't they lower the flaps?
This questions is awkward because without the convenient answer the BoI would have to entertain the plausible possibility that they, the pilots couldn't use the flaps, or decided not to, or their use may have compromised the air-worthiness of the A/c, as was seen in an incident where a fractured spar caused the disconnection of the flaps on one side of a Valiant, causing the pilot to raise them immediately as the A/c started to dip towards the side with the broken flap. This would tie in with the fractured spar found at the scene, further, an indication of where the failure began would be the dip to port on take off which may have caused the rapid emergency ascent which along with the minor problem with the nose wheel, led to the unusual 3.75 nm flight up the Welland Valley at an unusually low altitude, the A/c then unusually turned 120° ending up in a shallow "dive" giving the impression to some eyewitnesses of an attempt to perform an emergency landing on a disused runway. The reason why there was no desire to answer this awkward question in this plausible and possible way can only be down to thoughts of the consequences of an early grounding of the Valiant Fleet as a result of their Inquiry to their careers and to the propaganda war in general, safer all round to blame the dead crew.

Why didn't they notice the low engine power entering the turn?

This is an awkward question because, if as we have seen Mr Dexter (Witness 5) heard the engines being throttled back just before the turn then the power setting must have been higher during the straight and level phase of the flight and the subsequent deceleration for the turn shows the pilot was in control, answering this awkward question in this way would create another awkward question which is :-

Why did they turn there? The point where the A/c began its turn is significant, because all there was to do in the case of a failure of the nose wheel to retract on T/o was to abandon the flight by immediately turning 180° at the top of the climb, (flying on would serve no purpose and was against SOP) and descend the 500 or so feet to get on the upwind leg of the Wittering visual circuit for, either a further inspection by the ground or, to get instructions from ATC for a landing - after reducing weight to a safe level. (In the case of XD864 this would mean a minimum of emptying the under-wing tanks - this could be done in around a minute using the liquid nitrogen system.) Again anyone reading the report assumes that this is what was going on in the flight - this was SOP , the "normal drill" and the best thing to do in the circumstances, but flying the A/c a further 3.75nm up the Welland Valley broke SOP, flying over Barrowden Village at low altitude broke SOP and this implies that the "problem" was more severe than a failure of the U/c. The turn to port at Redhill Farm, exiting with the A/c in a position to glide to the ground at Spanhoe, implies a problem other than Human error, unless you are prepared to believe the Board's narrative where all of the actions of the crew starting with the throttle back at the top of the climb are not deliberate actions done for a reason, the actions of the pilots are, in the eyes of the BoI, "reflex", "reaction" and coincidence.

This is why the BoI speed up our perception of time, they amplify this by slowing the pilots down to slow motion speeds (caused apparently by the extremes of confidence that supposedly characterised their actions) and the framing device of "hurried " preparations, its effect is to make our perceptions of time and events seem dreamlike and unreal, through the looking-glass of the BoI report.

The chances of this sequence of events occurring to an experienced pilot, are so small that the BoI think that in the absence of them being told anything was wrong with the A/c, there must have been something wrong with the pilots, inventing an 'emergency' for the invented "over confident Captain" whose "slow reactions"... " in an emergency" caused the crash. Not only is the contention that overconfidence leads to slow reactions not supported by any evidence that may be found in any Scientific Paper extant in 1960 or in any subsequent research, but the statement;- *Over confidence causes no discernible change in reaction times, in an emergency*, would be the more likely outcome of any such research, even if a definition of "over confidence" good enough to identify, people afflicted in such a way, could be produced. Furthermore no anecdotal evidence has been found to support this opinion, the only opinion we could find was that generally *overconfidence might lead to increased risk taking possibly leading to an emergency*, which sits better with the attempted landing narrative.

Historical Context

The Historical Context to these events - U. K. Post WW2 to 1960 . The Cold War, The Arms Race,
The U.K.'s drive to return to the top negotiating table in world politics, by developing nuclear weapons and the means of delivering those weapons - The V-Bomber.

The "Problem" with the Valiant

The RAF knew in at least 1956 that there was a problem with DTD 683, the alloy the Valiant centre plane spar was made out of, but the materials low fatigue resistance was known from the very begining of the Valiant project in 1947, it was hoped that new techniques in manufacture would solve this inherent weakness. The other problem for the Valiant was that it was built to a 'safe-life' strategy, the 'safe-life' strategy of A/c design was abandoned in around 1956 as it could not ensure safety in a catestrophic failure. Also in 1956 this article:-

1790 Structural Changes Caused by Plastic Strain and by fatigue in Aluminium-Zinc-Magnesium-Copper Alloys Corresponding to DTD.683 (Broom and Mezza)

appeared in

The Journal of the Institute of Metals (JIM) Vol 86, 1957-1958, (written in November 1956)

The President of the Institute of Metals was Lord Tedder, Marshal of the RAF .

This article concludes...

".... alloys of better fatigue strength will have to be sought in alloy systems that [are] more stable .... than those of the D.T.D.683 alloys"

Article from 1956 Condemning D.T.D 683

Link
http://zkt.blackfish.org.uk/XD864/JIM_1790_17-23.pdf

The paper states that DTD683 was prone to 'catastrophic' failure that was 'auto catylytic' and could be initiated by stressing the airframe close to its limits in normal flight conditions, such as in turbulence, maneouvres or a hard landing. XD864 had suffered a main wheel blow out on landing ealier in its service life, an event that could lead to the kind of failure outlined in Broom et al's paper. DT683 stopped being used in A/c other than in components in compression such as U/c struts, its use was abandoned in 1959.

The Valiant should have been redesigned and rebuilt in 1956 and if the cost of rebuilding the Valiant, designed as a 'stop gap' until the 'advanced' V-Bombers came on stream, was prohibitive, then the Valiant should have been scrapped in 1956.

It wasn't until 1968 that further research showed a tenfold increase in the rate of fatigue crack growth in DTD683 in the presence of water or water vapour. The Valiant began its development at the end of the 1940's when not much was known about these super strong aluminium alloys, a great deal of research was being done, but the metallurgical data on DTD683 was still incomplete when the Valiant entered service with the RAF in 1955.

The lack of investigation into the fractured spar found at the scene is therefore negligent. Not only was the spar found, but the A/c also exhibited some of the behaviour seen in other known spar failures with flap control disconnection, the lack of the use of the flap, the several reported dips to port in the flight, the rapid emergency ascent on T/o and the evidence of an attempted emergency landing go together to form a very different and compelling explanation of the demise of XD864 from the one laid out in the report by the BoI.

The RAF grounded and scrapped the Valiant in 1965, the aircraft had been designed to fly at high altitude where air defence systems, including fighters could be defeated by flying high, this changed in 1960 when Gary Powers was shot down from high altitude by new Russian air defence missiles, this brought about a change in strategy, the aircraft were now to fly low under radar to avoid detection before climbing to release a "stand off" missile at around 100 miles from the target. This change in role meant that the fatigue life of the Valiant was dramatically reduced, e.g. WP 217, which suffered a spar failure in 1964 had flown only 55% of its expected service life. The Valiant was scrapped shortly afterwards as the airframe could not withstand the extra stress placed on it by flying at low altitude. The MOD had ordered the Valiant into the low level role even though they new of the instability in the alloy, not only that, but they ordered a machine who's fatigue life was calculated from its design role (that of a high altitude bomber), into a role that it was never designed for, not only that , but they knew of the instability of the alloy when they flew the Valiant in the Christmas Island atomic tests, with live Nuclear weapons on board, and if the propaganda in the Sunday Graphic (See "The Propaganda War" below) is to be believed, Nuclear weapons were being flown around the Planet in Valiants with spars manufactured from an unstable alloy.

Political Pressure

The U.K. V-Bomber force in 1960 comprised around 104 Valiants, 49 Vulcan B.1's approximately 40 Vulcan B.2's and about 40 Victor B.1's a total of around 233 Aircraft, of which the Valiant represented nearly half of the force. The implications both strategically and politically of grounding the Valiant Fleet as the result of an Inquiry into this crash would have weighed heavily on the members of the Board, and would not have been lost on Mr Clarke from the Air Ministry AAIB. Although by 1960, the strategy of flying a free fall nuclear weapon to within a few miles of its target was seen as a suicide mission with little chance of a crew finding its target in hostile territory, never mind returning to home base, the importance of the V-Bomber fleet in the propaganda war that constituted the major part of the cold war cannot be underestimated. The political pressure on the BoI not to find a problem with the Valiant and take the easier option of blaming a dead crew must have been immense. It is this pressure that might explain why the BoI choose to ignore so much of the evidence, and carry out the flight simulation tests with Pilot Error the only causal category considered. The BoI build a fiction about personality types, slow reactions and indecision, then use the erroneous data taken from the pathological Science of the flight simulation tests to support their fictional narrative.

The Propaganda War

from The Sunday Graphic 1957 Wickham third from left and Bullen second from left, died in the crash.

15 MINUTES, Mr DULLES —THE R.A.F. NEEDS 4

A V-Bomber Station, Saturday Night.

I HAVE just touched down after flying with the R.A.F.'s ever-ready H-bomb force.

I am the first reporter to have flown a sortie with these great four-jet bombers, part of the N.A.T.O. forces with which Mr. Dulles shook the world by saying: "They are ready to hit back immediately."

(And his Strategic Air Command chief said: "Fifteen minutes").

He didn't reveal half of it. In fact, the R.A.F. could be taking carefully-planned 'counter-action' in a very short time indeed. One pilot told me: "We've actually got airborne in four minutes from pressing the first starter button."

And it's my guess that every man on the great V-force already knows his target, has already been briefed on exactly which city, factory or rocket site he will obliterate.

Already briefed

When I asked where the H-bombs were, I was told: "You've already seen an aircraft with one aboard." Standing there, tuned up, ready to go.

Daily, weekly, the Big V's fly practice sorties against cities in England, even in Africa.

Nobody got bombed on our trip. But I saw how deadly the great near - sonic bombers are. They regularly achieve bombing errors of hundreds of yards only—and this from nearly ten miles up.

And the crews' morale flies a lot higher than that—as it does in any crack ut These are hand- ted men. Each a star is job, medically A-1

By GAVIN LYALL

Graphic reporter Gavin Lyall (left) with men of Britain's V-bomber force. Third from the left is the crew captain, F/Lt. Brian Wickham.

The five men of Flight-Lieutenant Brian Wickham's crew are typical. Their average age is only 30, all but one are married.

Friendly

Quiet, friendly men, wanting nothing except to grow old in peace.

But ready to become the most dangerous fighting unit the world has known.

Their four-jet Valiant is flying electronic workshop. In its nerve centre, a gadget-crammed cabin, sit three men who never see the ground from beginning to end of a flight.

Radar bomb - aimer Johnny Ireson; navigator Harry Bullen; Air Electronics Officer Robert Nairn. These men are the Valiant's brain.

They know that, in a war, some of them may be caught by fighters and missiles. But they also know a few little dodges to fox enemy radar—upon which both fighters and missiles must depend.

I watched them slip a fast one across our own fighters — although just how, I'm not allowed to tell . . .

Bombs away

Then we were set into our bombing run. The ominous count-down began: "Three miles to target . . . two miles . . . steady . . . one . . . bomb gone!"

Luckily for the peaceful English town beneath, the bomb was strictly imaginary. But the V-bomber crews have all flown with bombs that were anything but imaginary. And perhaps tomorrow . . .

So I say this: sleep sounder tonight. I shall, because I know that if tomorrow ever comes the Big V's are ready. And know that Other Peo must know it, too.

Strange then that the BoI think the "hurried preparation" was a factor in the causal chain of this accident, the propaganda boasts of getting airborne in 4 minutes, surely the crews would have to hurry and train to do things in a hurry. There is much propaganda in the above article not least is the mention of an A/c bombed up with an H-Bomb and ready to go, when in fact it is known that the U.K. had no weaponised H-Bomb in 1957.

From the BoI's use of phrases like...

*"The Captain **may** have been approaching an overconfident stage in his flying..... such an attitude **could** lead to slow reactions in an emergency"*

It is clear that the BoI were unsure as to the causes of this crash, and so had to use their experience and knowledge to create the story we have in some part been exploring. Their narrative as we have seen was based on **erroneous data** gleaned from flight simulations that were set up to explore only one of the possible causal categories and based on a **"very unlikely" hypothesis**. Their narrative is **not internally consistent** and is largely **not based on the evidence**, but is instead what they imagined might have happened.

The recently released Tench Report an inquiry into military crash investigations, might explain the precipitious rush to judgment apparent in this BoI, Tench damned senior officers for intefering in BoIs, here is just one quote from Tench.

" A disturbing feature is the influence which senior officers seek to exert on the investigation process, particularly in the RAF. Presidents of boards are conscious of a hovering presence in the background. The pervasive nature of the involvement some station commanders and even commanders in chief, is an unwelcome intrusion upon what should be the complete independence of the board of inquiry

The opportunities for staff to influence the boards interpretation of evidence or even their findings, must throw some doubt on the complete freedom of the board to draw its own conclusions.
"

This BoI is not the base on which to condemn a dead Captain of "blameworthy negligence" and so we are calling on the RAF to exonerate Flt. Lt Brian Wickham.

Here we present another plausible and possible Reconstruction of the Accident.

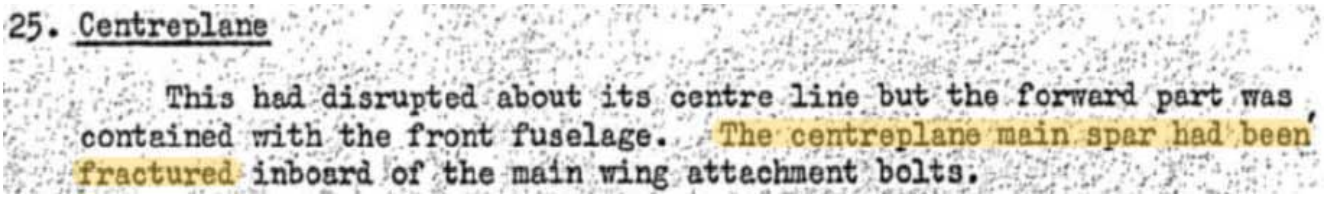
Having explored the BoI's flawed narrative, it might be useful to see if we can create an alternative narrative that doesn't depend on speculation about the personalities of a cast of characters, but instead focuses on the evidence and other evidence that has come to light during the two years of research we have conducted.

Here are two accounts of the experiences of crews who suffered a spar failure in a Valiant.

"On 29/4/57 The second Valiant prototype -215- had developed a fatigue crack in the bottom main spar cap through about 30% of its cross section. The rest broke under the stress of an AUW flight at 210 KIAS and about 20 degrees of bank in slight turbulence ...
The spar let go with a terrific bang and shock and ***the Valiant started to roll into the broken wing."***

"the co-pilot who was not familiar with large aircraft pushed the nose down rather fiercely to level off. The crew heard a loud bang. Being unable to locate the cause they decided to recover to Gaydon. Upon joining the pattern ***they selected flap and the aircraft started to roll to the right so the selected it back in and flew a flap-less approach and landing*** *On shutdown they inspected the aircraft and found the* ***right wing appeared to have moved away from the fuselage*** *by a couple of inches or so. Because the* ***Valiant flap mechanism was driven by a rod and cog system from electric motors in the fuselage the right wing system had disconnected*** *due to the wing movement thus possibly saving the wing from being ripped off"*

Here is all that is said in the BoI report about the **fractured spar** found at the scene, in the AIB pro-forma



25. Centreplane

This had disrupted about its centre line but the forward part was contained with the front fuselage. The centreplane main spar had been fractured inboard of the main wing attachment bolts.

A fractured spar is a **major clue of a possible structural failure**, it was **not investigated**.

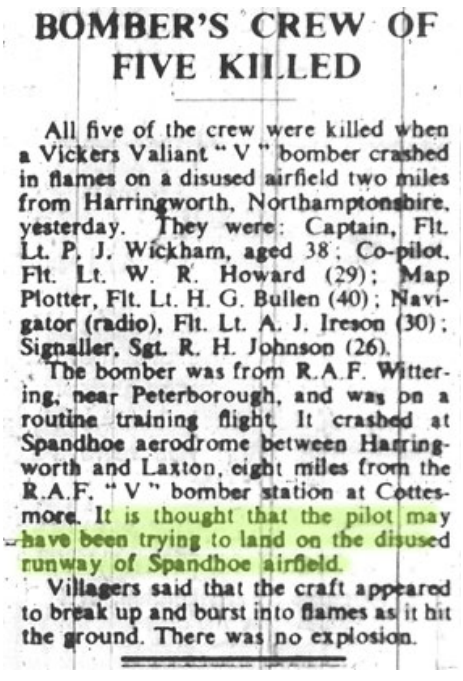
We have spoken to Alan Foster the first witness visited by the BoI who said in 2008.

"I had the distinct impression the pilot had seen me and tried to avoid hitting me".

We have also spoken to a work colleague of Danny Murray one of the first people at the scene, but whose testimony wasn't used by the BoI. Danny Murray is no longer with us, but he often spoke of the crash with his work colleagues and friends. He said :-

"The A/c almost made a perfect belly flop landing".

From the Times on the 13th August 1960.



BOMBER'S CREW OF FIVE KILLED

All five of the crew were killed when a Vickers Valiant " V " bomber crashed in flames on a disused airfield two miles from Harringworth, Northamptonshire, yesterday. They were: Captain, Flt. Lt. P. J. Wickham, aged 38; Co-pilot, Flt. Lt. W. R. Howard (29); Map Plotter, Flt. Lt. H. G. Bullen (40); Navigator (radio), Flt. Lt. A. J. Ireson (30); Signaller, Sgt. R. H. Johnson (26).

The bomber was from R.A.F. Wittering, near Peterborough, and was on a routine training flight. It crashed at Spandhoe aerodrome between Harringworth and Laxton, eight miles from the R.A.F. " V " bomber station at Cottesmore. It is thought that the pilot may have been trying to land on the disused runway of Spandhoe airfield.

Villagers said that the craft appeared to break up and burst into flames as it hit the ground. There was no explosion.

This evidence along with the reconstruction of the flight, and Witness 1's description of the last moments of the flight

" I .... looked up and saw a large jet aircraft flying comparatively level about 50ft. above the runway and along the line of the runway. It appeared to be going slower than I normally expect...."

are a very strong indication of a landing attempt.

9. Our Reconstruction of The Accident.

We consider that the evidence supports the following chain of events.
Preparations for the flight were normal. The co-pilot was new to the crew, but standardised training would minimise potential hazards.
The Captain had been on the go for over four and a half hours, two of which were spent driving cross country. The co-pilot was more familiar with the Wittering circuit protocols as the captain's Squadron hadn't been issued with the order book for Wittering. and so it's likely that the Captain allowed the co-pilot to perform the take off for safety reasons.
The Co-pilot took off, but during the take off a severe structural problem arose. the centre-plane main spar had fractured, this caused the port wing to separate and caused the rod connecting the port flaps to the motor in the fuselage to disconnect, adding to the minor problem with the failure of the front wheel to retract. The Captain immediately took control of the A/c and as the flaps had been raised prematurely on T/o attempted to lower the flaps, only the starboard flap responded and the A/c began to dip to port, realising the seriousness of the situation the Captain again retracted the flaps as their use made the A/c uncontrollable, trimmed out the A/c and immediately began a full powered ascent to around 2000ft. Having gained sufficient height the Captain levelled off and very quickly realised he needed to attempt an emergency landing at Spanhoe, The Captain flew the stricken A/c down to 1000ft, and ascertained with the help of the Navigators the required manoeuvre and prepared to carry out that manoeuvre, decelerating just before the turn,
The A/c performed the turn of 120° losing approximately 300ft, The speed of the A/c was kept low and on coming out of the turn must have been close to stalling. The A/c needed to lose a further 650 feet in a short period of time, the Captain allowed the A/c to lose a further 350 feet and gain sufficient speed to allow a shallow glide approach, once the required height was lost in the rapid descent, the Captain made a final course correction and flew the glide approach at approximately 2.5° - 3°. As the A/c approached the runway the pilot spotted a man on a tractor very close to the runway, fearing he might hit the man the Captain increased engine power, and pulled back on the spectacle. the A/c dipped to port and the wing tip caught the ground. the A/c twisted and slid into the ground.

Here is the opinion of an ex chief test pilot who was flying Valiants in 1960, after looking through the BoI into XD864.

The BoI findings appear to me to be 'a rush to judgement'. To me the telling evidence is that of witness statements that lead one to conclude that the Captain was attempting an emergency landing, and that the aircraft was under control as it flew along the disused runway. This is totally inconsistant with a recovery from a stall but fits in with the supposition that they had suffered a spar failure. In this case the captain would have tried to minimise the stress on the wing by limiting any changes in configuration, ie; u/c and flaps, and keeping the speed and angle of bank low. The only surprising thing to me is that there is not any evidence of a radio message.

Here are some quotes about the Valiant from those who used to fly them.

"“Don’t worry about it, chaps. 217’s just a one off.” My squadron commander addressing us aircrew after we had been told what had happened to WP 217’s main spar"

"The undercarriage was a Heath Robinson affair, as was most of the aircraft."

"The Valiant problem was nothing to do with metal fatigue in the expected sense like the Comet or aircraft at low level. The lightweight alloys used for the main spar had an inherent failure. They would crystallise when formed and became fatigued whether fitted to an aircraft or not. After the fleet was grounded systematic checks were made on all the aircraft. A trials aircraft, with just 5 hrs on the clock, was about to be given a green light when they removed just one more rivet to be sure. Cracks were found and that was that. Checks were made on spare spars and they too exhibited the same fatigue failures."

"I was a navigator with 207 squadron R.A.F. Marham during 1950s . The valiant was a special aircraft, but not without its problems, Metal fatigue was the fear of aircrew."

Conclusions

We have now seen that two narratives of the crash are possible, the stall in the turn or an emergency landing, more of the evidence fitting with the latter than the former which is mostly a fiction about the personality types of the pilots, and involves some quite startling "special effects" with time in order to succeed. We have seen the negligence of the AAIB inspector who reports that "no evidence" of a structural failure was found, when he had found a fractured spar, which he did not investigate further. Without a full forensic examination of the spar it is impossible for the AAIB inspector to say he found no evidence of a structural failure. The fact that an alternative more believable narrative of an emergency caused by a broken spar and a landing attempt can successfully be made from the evidence, more believable because it notes all the evidence available and makes no assumptions about the crew other than perhaps that the actions they took during the flight were deliberate and for a reason and not quirks, errors, reactions, reflexes and coincidence, highlights that the conclusions of the BoI are to say the least dubious .

Thanks to Sara Selmes, Carol Johnson, Michael Bullen, Peter Beech, Alan Foster, Bill Cooper, Rev Jane Baxter and the Wardens of Harringworth Church, Julian Temple, Albert Kitchenside at Brooklands Museum, The Corby Evening Telegraph, Dick Haven, John Dillon, The contributors to the PPRuNe thread.

In Memory of the five crew who lost their lives.

*“ONLY IN CASES IN WHICH THERE IS **ABSOLUTELY NO DOUBT WHATSOEVER** SHOULD DECEASED AIRCREW BE FOUND NEGLIGENT”*

Appendix

Paragraph 8

8. Attitude of the Crew to Flying. There is evidence to suggest that the Captain may have been approaching an overconfident stage in his flying. The decision to allow an untried co-pilot to take-off on his first flight..... 18th witness
with the crew is at least unwise, particularly for a non-
U.F.I. The non-observance of standardised procedures,
contrary to the Squadron Commander's orders, also suggests..... 13th witness recalled
that the Captain thought he knew more and better than most
pilots. Such an attitude can lead to slow reactions in
emergency. From the evidence it is also clear that Flt. Lt.
Bullen made little or no attempt to equip himself with a..... 22nd and
protective helmet. This reflects on Flt. Lt. Bullen, and also..... 26th
on Flt. Lt. Wickham for allowing him to continue flying
without his full flying equipment. witnesses

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Page 21 of original

18th Witness

No. 1387901, Chief Technician JOHN COLYER Mc CAFFERTY, Aircraft Servicing Chief, of No. 7 Squadron, Royal Air Force WITTERING, being duly sworn, states:- "I am the Aircraft Servicing Chief in charge of VALIANT aircraft XD 864. At 07.00 hours Z on 12th August, 1960, I took over VALIANT aircraft XD 864, and by referring to the F 700 and the hand-over book, I determined that the After Flight servicing had been completed and signed for, and that the Before Flight servicing had been completed with the exception of the Replenishment Certificate, the hood detonator plug and contact breakers, and the underwing tank 28 volt fuses. I instructed the appropriate tradesmen to complete the outstanding items of the Pre-Flight inspection supervised their work, and ensured that they signed the relevant columns of the F.700. At 08.20 hours Z, I scrutinised the F.700, assured myself that all the necessary rectifications and inspections had been signed for and that the aircraft was fully serviceable to fly. I then signed the F.700 with the local time of 09.20 hours. I went to the aircraft with the F.700 to await the crew and to complete checks similar to those which I knew the pilots would do. At about 08.55 hours Z the aircrew arrived, and four of the crew including a co-pilot I had not met before entered the aircraft. The captain, FLIGHT LIEUTENANT WICKHAM, did a complete external check although he did not use a Check List. He then thoroughly perused the F.700 and signed the acceptance column. He got into the aircraft and started the internal checks. He completed Tail Plane Incidence (T.P.I.) and trimming checks without any intercommunication. He then called on the intercommunication system for the internal checks. He went through the whole Check List quite normally with the following exceptions:- (a) He did not complete auto-pilot and zero reader checks, and (b) when he came to the T.P.I. and compass checks he said, "T.P.I. to co-pilot fine, take off", and, "compass to co-pilot". / The Air Electronics Officer queried these by repeating them and FLIGHT LIEUTENANT WICKHAM confirmed that these were selected to the co-pilot position. The remainder of the checks, including the start up, were quite normal and I heard the plotter and the navigator/radar report their equipment serviceable. The aircraft taxied out at about 09.25 hours Z and stopped about, 60 yards from the dispersal for a short time. It then continued taxying and I returned to the dispersal offices. I saw the aircraft take off, and when it passed me the nose wheel was "down", although the main undercarriage appeared to be fully "up", and the aircraft was climbing at a steeper angle than normal. As the aircraft was climbing I noticed that it turned slightly to port, but then continued straight ahead. I then went to telephone to the Tower to ask them to let the pilot know that the nose wheel was down".

/ Page 22 / original

Signed. J.C. McCAFFERTY

Question No. 7. "When the aircraft was climbing away did you observe the position of the flaps?"

Answer No. 7 "To the best of my knowledge they were "up".

Signed. J.C. McCAFFERTY.

meteorological officers statement

(28)

CONFIDENTIAL

16. Certified True Copy....

Page 19 of original

16th Witness Mr. WILFRED HENRY IRESON, aged 51 years, Senior ~~Navi~~ meteorological of Royal Air Force, WITTERING being duly sworn, states:- "I am the Senior meteorological Officer of R.A.F. WITTERING and on the morning of the 12th August, 1960, I was the forecaster on duty at that station. I carried out the normal meteorological briefing at 07.30 Z hours, on the 12th August, 1960 which was attended by FLIGHT LIEUTENANT WICKHAM and crew. I produce herewith a certified extract of the weather observations recorded in the register of daily observations (Exhibit "H"), and a copy of the local area forecast distributed to all crews who were flying that morning (Exhibit "J"). The weather was good and the observations recorded at WITTERING are equally applicable to the area of the crash which is close by".

Signed...W.H. IRESON

paragraph 5

5. The Simulator Tests. The tests showed that if the.....Appendix 'C' take-off and climb were steep and at high power, a very large reduction of power was required to achieve stable level flight below 170K. To control the speed it was necessary to throttle almost right back and then increase to a low power of about 6,000 R.P.M. The tests also showed that if the speed of entry into the turn was 160K or less with the power appropriate to that for level flight and the angle of bank 30°, the aircraft would reach the stalling speed by the time it had turned through 90°. There would also be loss of height during the turn prior to the stall so the aircraft would have considerable downward inertia on recovery from the turn even if the aircraft did not actually stall. The Board considered that these tests were too closely similar to the observed behaviour of the aircraft to be ignored.

Tests Completed in Valiant-Flight-Simulator

Introduction

1. The Board visited the Valiant Flight Simulator at Marham to conduct tests designed to reproduce the circumstances of the flight under investigation. For the first test, only the first pilot was briefed on the requirement.

2. Initial conditions for all tests were those appropriate to the take-off condition of Valiant XD 864 viz:-

(a) Fuel load: Full internals plus 6.000 lbs in each wing tank.

(b) A.U.W. : 145,000 lb.

(c) C.G. : 47·55 ft. aft of datum.

(d) Q.N.H. : 1,008 mbs.

(e) Manual Elevator: ¾ division nose down.

(f) T.P.I. : -0·75.

Test No. 1

3. Intended Pattern.

(a) Normal take-off, 8,000 r.p.m., heading 260 degrees M. with simulated nose wheel failing to retract selected. Co-pilot in control.

(b) Raise undercarriage and flaps together.

(c) Throttle back to 7,600 r.p.m. when speed reaches 150 K.

(d) When main undercarriage and flaps up, increase engine power to 7.800 r.p.m., maintaining climbing speed below 170 K.

(e) Level out at 1,800 ft. Q.N.H.

(f) Throttle back to maintain level flight at 160 K.

(g) At approximately 6 nautical miles, enter 30 degrees bank turn without increasing engine power.

4. Data Required. Height variation when levelling out and during turn. Speed variation during turn.

5. Conduct of Test. A comparatively inexperienced co-pilot from R.A.F. Marham was selected and briefed to take-off normally, climb to 1,800 ft. level out and enter turn to port at 30 degree bank. A simulator Instructor was fully briefed on object of exercise and acted as Captain.

6. Result of Test. When nose wheel failed to retract, co-pilot called for reduction of power to reduce speed and angle of climb to make take-off gentle and keep speed within limits. He levelled out + or - 75 ft. and with 7,000 r.p.m. selected immediately entered turn to port at 30 degree bank. Speed was maintained between 160 K. and 170 K. through 180 degree of turn. As the co-pilot did not conform to the steep climb pattern required, this test was repeated later (Test No. 4)

Test No. 2

7. Repeat of Test No 1 except that levelling out speed should be 150 K. with appropriate power.

8. Conduct of Test. Co-pilot was rebriefed, this time requesting him to continue climbing after take-off with normal full climbing power and to stabilise in level flight at 150 K. before entering turn.

9. Result of Test. Co-pilot levelled out + or - 100 ft. Reduced power to 6,400 r.p.m. but air speed increased to 175 K. Power was reduced to 5,500 r.p.m to reduce speed but almost immediately restored to 6,000 r.p.m. as speed fell off. Lost 200 ft. of height. Entered turn at 1,600 ft. and during first 45 degree of turn speed fell to 145 K and height to 1,400 ft. After 90 degrees of turn speed had fallen to 140 K. and height to 1,200 ft. Thereafter speed fell very rapidly below 137 K. (Calculated Stalling Speed) so the Captain took control, excluding T.P.I., and simulated recovery from a stall calling for increase of power. Lost a further 600 ft. of height.

(NOTE: The Simulator will not stall, so the characteristics below the calculated stalling speed do not conform to the aircraft behaviour.)

Test No. 3

10. Repeat of Test No. 1 except levelling out speed should be 170 K. with appropriate power.

11. Conduct of Test. As in Test No. 2 but aircraft stabilised in level flight at 170 K. before entering turn.

12. Result of Test. Co-pilot levelled out + or - 100 ft. Power was reduced to 6,000 r.p.m. and then increased to 6,400 r.p.m. to stabilise. Airspeed in turn varied from 170 to 165 K. but did not fall below 165 K. during 135 degrees of turn.

Test No. 4

13. Repeat of Test No. 1 as originally intended, but if speed dropped to 137 K. in the turn, the bank was to be increased to 45 degrees before taking recovery action.

14. Conduct of Test. As in Test No. 2 except that aircraft was stabilised in level flight at 160 K. before entering turn.

15. Result of Test. Co-pilot levelled out + or - 100 ft. Power reduced below but readjusted to 6,000 r.p.m. to hold 160 K. In first degree of turn, speed fell to 145 K. with 300 ft. loss of height. In next 45 degrees of turn attempt was made to hold height but a further 100 ft. was lost and speed fell to 130 K. before Captain could take over and complete recovery action and call for power. Total height lost in manoeuvre was just under 900 ft.

Discussion of Results of Tests

16. The test were designed to reproduce observed patterns disclosed by the evidence of witnesses as follows:-

(a) Steeper than normal climb from take-off. (7th, 17th 18th Witnesses)

(b) Irregular engine noise when levelled out.
(This is characteristic of closing the throttles) (5th Witness)

(c) Engines at low power in and after turn. (2nd, 3rd Witnesses)

(d) Loss of height and instability in recovery from turn. (2nd Witness)

(e) Shallow dive and increase in power. (2nd Witness)

Certified True Copy....

17. A speed range of 150 K. to 170 K. was selected for trial because any lower initial turn would have resulted in a stall almost as soon as bank was applied and any higher speed would have been above the limiting speed for lowering the undercarriage. The estimated total distance covered from take off to crash is about 8 nautical miles. With a time interval of 3 minutes, this gives an average ground speed of 160 K. As there was a slight tail wind the average airspeed would be slightly less than 160 K. Normal circuit flying (but with flaps down) is completed at 150 Kts. so the speed selected is not likely to be far removed from 160 K. In the trimmed condition for 160 K., a Simulator Test gave a T.P.I. Setting of just under - 1·0.

18. Accepting the fact that the Simulator (as distinct from the aircraft) will not stall, the only reliable simulation is in the loss of speed and height up to the stage at which the calculated stalling speed (137 K. at 144,000 lb. at 30 degrees of bank) is reached. The tests therefore indicate that any aircraft entering a 30 degree banked turn at 150 - 160 K. with flaps up and the power appropriate to the relevant straight and level flight condition, will lose speed and height and reach the stalling speed after approximately 90 degree of turn. If the speed on entry is 170 K. or, of course, higher, and with the appropriate power, the turn can be completed safely.

19. The Board considered the possibility of completing a confirmatory test in the air, but the hazards associated with such a test and the risk of severe stresses on the test aircraft do not allow the Board to recommend such a flight test.

Signed.....K. RITCHLEY

Reconstruction of the Accident

Marked are statements that are dubious for various reasons see Key:

Key:
- Dubious Statements
- From Flight Simulations
- Not Supported Evidentially
- Might have other plausable Explanation

9. The Board's Reconstruction of the Accident. The Board consider that the evidence supports the following chain of events. The crew were short of time and their preparations for flight were rather hurried. Nevertheless. ..... 18th witness
The Captain decided that he would allow the co-pilot to take-off and complete the climb. The co-pilot took off..... 7,17th and
and climbed rather more steeply than usual with full..... 18th witnesses
climbing power. The nosewheel failed to retract so the..... 6th, 7th
speed was kept down to 170K. The aircraft levelled off..... 17th and
between 1,000 and 1,500 ft above airfield level(500 ft)..... 18th witness
but the co-pilot allowed the speed to exceed 170K so the
Captain throttled right back temporarily to help control
speed and height. This attracted the attention of the..... 5th witness
eye-witnesses. The aircraft lost a little height but
stable level flight was achieved for a very short time.
With the aircraft flying at about 160 K. with a power
setting of approximately 6,000 r.p.m. and a height
of about 1,000 ft above airfield level. The Captain is
likely to have selected this height to remain in the
visual circuit pattern and to remain below the height ..... Appendix 'M'
(1,500 ft above the airfield) at which following aircraft
who were leaving the local area would be flying. The
Captain then ordered the co-pilot to start a normal 30°
banked turn to the left to bring the aircraft on the
downwind leg prior to completion of undercarriage checks.
The Captain would be keeping a look-out to the left in the
turn. As the aircraft turned it would lose speed and
height until it reached the stalling speed of 137 K. after about..Appendix 'C'
90° of turn. The unsteadiness of the aircraft would then attract
the Captain's attention and he would doubtless order the
co-pilot to come out of the turn, or take control himself.
Realising the seriousness of his position he would grab the
controls. The automatic reflex action to pull back could
stall the aircraft and normal stall recovery action would have
to be taken. The call for extra power may well have been delayed or
the opening of the throttles delayed, either by indecision
as to who was in control, or by the slow reactions of the
co-pilot. The Captain would make every endeavour to avoid
hitting the ground, but unfortunately the ground he
was flying towards was higher than he would expect .....Appendix 'T'
(350 ft. A.M.S.L.). Still sinking, he pulled the
control column too far back and stalled into the ground ..... 1st Witness.
from a low height at low forward speed, but with the engines..... Appendix 'A'
developing more and more power ..... 2nd Witness