Cover-ups, Foul-ups, and Credibility Lost

An Executive Summary of U.S.Read's March 26th Exclusive

April 1, 2004 – by Brett Hoffstadt

The tragedy of Flight 587 remains an open, unresolved pain for many people in the City. One thing that could help significantly is an explanation. The NTSB investigation is still in progress with the final report expected some time this year. They continue to focus on the actions of the pilot, whose alternating rudder inputs are believed to have caused catastrophic loads on the vertical tail.

Recently, three major parties to the investigation submitted their own formal review of the accident to the NTSB. American Airlines (AA) and the Allied Pilots Association (ALPA) both point the finger at Airbus for designing a rudder system that allows a pilot to produce such catastrophic loads on the aircraft. At the relatively low speeds of Flight 587, they say, pilots should have full use of the flight controls.

In fact, this Airbus aircraft (an A300-600) has a specific device to limit the rudder deflection. It is called the Rudder Travel Limiting Unit (RTLU). This is a controversial piece of equipment, and we will come back to it shortly.

Airbus, in their submission to the NTSB, claims that their aircraft performed exactly as designed and as required by all regulatory authorities. If the pilot hadn't used such forceful and repeated rudder inputs, the tail would not have broken off and the aircraft would have survived. Therefore, the pilot is at fault, along with the training that taught him this behavior.

There are serious problems with the Airbus account. As shown in the March 26th U.S.Read article, there is good reason to suspect the rudder system did not function as intended on Flight 587. But there is much more to share.

There have been other incidents with A300 aircraft where the rudder created extremely high forces on the vertical tail. Although none of these tails broke off in flight, in at least one case the RTLU failed to keep the rudder within its proscribed limits. As a result, the tail experienced loads that exceeded the highest design threshold – the rupture limit. This incident happened in 1997, on American Airlines Flight 903 over Miami, Florida.

Similar to Flight 587, the pilot of Flight 903 made several strong, alternating rudder inputs as he attempted to regain control of the aircraft. Wondering about the loads on this aircraft, and why it survived when Flight 587 did not, Victor Trombettas of U.S.Read took a close look at the records in the NTSB database. He made some startling discoveries.

First, this pilot made *nine* rudder reversals. Sten Molin, the pilot of Flight 587, only made four. Second, Flight 903, at one point in it's upset event, was flying faster than Flight 587 was, making all the loads on the aircraft more severe. Despite experiencing far greater forces in every direction compared with Flight 587, the tail and engines remained attached on Flight 903.

However, some of the Flight 903 load calculations (the bending forces experienced by the tail) weren't readily available. The NTSB had relied on Airbus to provide these calculations using data from the onboard recorders. Portions of some Airbus charts showing these calculations were covered by large boxes stating "no recorded parameters", or "loads accuracy doubtful".

But buried in the reports, and hiding literally behind these large boxes, was actual data.

Why didn't Airbus show all the available data? Recall the Rudder Travel Limiting Unit (RTLU). The data showed that the rudder deflection went beyond this limiter at least five separate times during the pilot's inputs. As a result, the vertical tail experienced loads well above the ultimate limits.

Airbus kept all this information from the NTSB in 1997 when Flight 903 was investigated.

If those loads were to have been shown, the NTSB would have asked questions. That would have pointed to the failure of the RTLU. Airbus' manipulation was so bold they even revised numbers in their favor when plotting values from the tables.

That was 1997. The NTSB didn't catch the significant RTLU malfunction in the data, nor Airbus' manipulation of the data. As a result, lessons from that flight were never learned, and honest pilots were blamed for a system that didn't perform as expected.

Now we come to Flight 587. Alarmingly, the NTSB is once again entrusting Airbus to provide rudder and loads data to the NTSB. What will happen this time?

The NTSB believes the vertical tail broke off at 09:15:58.5 A.M. Airbus loads calculations for this moment are based on a rudder position of 11.5 degrees. But the RTLU setting was 9.3 degrees. This obviously points to a failure of the RTLU. When the NTSB asked Dominique Chatrenet, the VP at Airbus in charge of Flight Controls, about this discrepancy, Mr. Chatrenet had an inventive answer. He said the rudder position was actually at 9.3 degrees, but it was in the process of failing. The structure was deforming, thus providing this (incorrect) rudder value of 11.5 degrees.

The problem with this is that FAA certification requires ultimate loads be withstood for three seconds. If Mr. Chatrenet is correct, the structure began failing immediately upon encountering ultimate loads, if not earlier. Officially, however, both the NTSB and Airbus publicly maintain the tail failed well above ultimate loads.

Yet the NTSB was able to say "Investigators have found no indications of any rudder system anomalies." They also did not question Mr. Chatrenet further after he made his inventive statement. Why not?

There's another place to look for information. The rudder position data is filtered, or averaged, before it's recorded on the flight data recorder (FDR). Therefore, it is not a perfect real-time reading. There is *un*filtered rudder *pedal* data. The rudder pedal position is recorded in real-time without any averaging or filtering. This is therefore the most accurate record of what the rudder should be doing. This data shows the pedal went to a value of less than 7 degrees just before the alleged tail separation time, and then headed back to 4 degrees.

The pedal data does not support the theory that an 11.5-degree rudder movement created the tremendous loads that broke off the tail. In other words, the NTSB and Airbus theory is based on manufactured data.

Clearly, if the rudder position had continued past 7 degrees, and then caused a structural failure, something other than the pilot is to blame since the rudder *pedals* do not indicate this occurred.

Will resolving the rudder or tail failure explain the crash of Flight 587? Probably not. After all, Flight 903 experienced higher loads, and more of them, without losing its tail. And there is substantial evidence, not to mention statements from dozens of witnesses, that suggest things were going very wrong on the aircraft before the tail fell off. That evidence includes other debris, air traffic control transmissions, and a bridge tollbooth video showing Flight 587 in flight, to name a few sources.

There are many clues the NTSB seems to be ignoring or failing to assimilate. And for all of their attention to the vertical tail, how could they disregard what must be either an RTLU failure or a premature structural failure?

The search for answers continues at U.S.Read. From our perspective, Airbus and the NTSB have lost their credibility, and capacity, to find them.

An expanded version of this article, complete with many figures, can be found at http://www.usread.com/flight587/coverups_n_foulups/default.html

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Brett Hoffstadt is one of the many industry experts contributing to U.S.Read's Flight 587 coverage. Mr. Hoffstadt began working in the aerospace industry 14 years ago. He has two degrees in aerospace engineering and specializes in aerodynamics and aircraft performance. He is currently employed by an international engineering analysis company and previously worked at Boeing as a Technical Specialist in Aerodynamics. Mr. Hoffstadt also has professional experience in structural design, composite materials, propulsion, flight simulation, and flight testing. He currently resides in Queens, New York, with his wife and daughter.

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