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NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

AIR ACCIDENTS INVESTIGATION BRANCH (AAIB)
LETTER DETAILING THE RECONSTRUCTION OF
USAir FLIGHT 427

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Accident to Boeing 737-300, N513AU on 8 September 1994 at Aliquippa, PA

The following observations are made following examination of the wreckage at the USAIR hangar at Pittsburgh Airport during 2-9 November 1994. During this time the structures group were engaged on specific reconstructions of selected areas of the airframe. A general layout of the major items of wreckage had already been achieved.

The impact destruction of the airframe was such that it was similar to that encountered with the impact of high speed military aircraft and extreme for that associated with civil aircraft accidents. Unlike military aircraft, however, an airliner contains many common or similar structural components, such as floor beams, which further complicates identification. In addition to the break-up some sections had suffered fire damage.

Following a gross sift of all the wreckage a special search was carried out to identify pieces for the reconstruction of some specific elements of the aircraft structure.

* The forward pressure bulkhead
* The floor beams
* The wheelwell including the pressure deck
* The 'PATS' auxilliary fuel tank

Since the results of the first reconstruction effort resulted in a disappointing lack of positively identifiable components, a second sift of the previously unidentified wreckage was undertaken on 5 November with the additional task of separating floor panels and radome fragments.

As of the date of this note, the second sift has been complete and sorted for pieces from the above elements. As expected, further relevant pieces were found but their impact on the reconstruction effort has not been great inasmuch as there are still large gaps in many areas which currently preclude any firm conclusions being drawn.

The following is the AAIB view on the individual areas of reconstruction:-

The Forward Pressure Bulkhead

Full sized drawings were attached to boards and covered with plexiglass to allow laying of the fragments of the bulkhead over the plans. To date around 20 pieces have been positively identified covering about 50% of the plans, mainly the right side, the largest being about 12" x 12". However, given the three dimensional nature of the structure the elements identified represent a lesser percentage of the bulkhead.

It is understood that it is planned to illuminate the bulkhead reconstruction with ultra-violet light to check for bird remains. As ultra-violet light highlights the presence of any organic matter, a 'positive' indication would require further analysis to check for the presence of bird debris. No attempt has been made so far to reconstruct the radome, which presumably should also be subjected to this inspection and the components of the weather Radar have not been identified.

The Floor Beams

The full size floor beam drawings were mounted on cardboard, covered in transparent plastic for protection and placed in order on the hangar floor.

Approximately 40% of the floor beam webs have been positioned on the drawings although some elements could be mis-placed since dimensionally they are similar at a number of individual stations. Almost without exception the beam caps had separated from the webs and yet it is the caps which would appear to be the elements of the beam which would display best evidence of the scenario for which t he construction was undertaken. Despite considerable effort, it has not proved possible to match a single beam cap to one of the webs - only fracture matching being available to achieve this.

The limited amount of debris identified as floor beam web but unplaced is in many small pieces. It is very doubtful whether any further searches of the debris will yield sufficient new material to make the floor beam reconstruction more meaningful. Representatives from Boeing have identified a proportion of the rudder cables and are laying them across the floor beams in their approximate locations.

PATS Auxiliary Tank

Examination of this component is currently being undertaken by the PATS representative and other members of the team. Again only about 50% of the tank structure has been positively identified, being extremely lightweight honeycomb-cored material. It is noted that the tank itself is not attached to the cabin floor beams or station 727 bulkhead, so the possibility of deformation of the cabin floor beams due to tank implosion appears somewhat remote. Hopefully the pieces located will be sufficient to answer any questions regarding the possibility of an explosion.

A majority of the key system components have been located and are being examined for pre-impact defects.

Centre-section and Wheel Bay Area

Although drawings and a layout scheme have been prepared, it is clear that again only a modest proportion of these areas are available for reconstruction. In particular the pressure floor above the wheel bay, despite being of quite distinctive appearance, is almost completely missing - there being only about 6 pieces totalling roughly 2 sq ft. As with the floor beams, a further sift of the debris in the dumpsters, whilst it might yield additional pieces, will almost certainly fail to provide enough to furnish conclusive answers to the questions which the reconstruction is intended to address.

Floor panels

The second sift has identified only a small percentage of these panels, and without exception they are in a badly mutilated condition. It is clear that this debris will provide no information to assist the investigation on the question of pre-impact penetration.

Flight Data Recorder (FDR)

The relevatively small number of parameters (11) recorded on the FDR is a further handicap to the investigation. The addition of flight control surface positions for example would have enabled the investigators to eliminate certain possible causes if not identify the cause of the flight path departure.

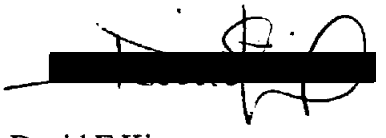
The availability of extra parameters could have had a major impact on the activities of the structures group, some of the resource intensive tasks covered above may have been rendered unnecessary. Similarly, video recordings of the flight deck and/or the aircraft exterior would almost certainly have had a major effect on the conduct and effective conclusion of the investigation.

Conclusion

All the reconstruction work attempted so far has been severely hampered by a shortage of identified components. This situation prevails despite considerable and dedicated effort by the staff from NTSB, FAA, USAir, ALPA, Boeing and the Mechanics' Union engaged on searching through the wreckage. It must be concluded that the 'missing' components are too badly disrupted to be recognised or have been consumed by fire.

For the reasons already stated above, the reconstruction tasks are immensely difficult and appear at the moment to be unlikely to furnish the investigation with the conclusive answers it seeks even given unlimited time and manpower. Consequently, if it is felt necessary to pursue further searches of the wreckage, it would help if a more detailed definition of what is sought to be achieved were provided. It would be helpful if the proponents of any further searches could come to the A1 hangar and discuss their potential benefit and to give a finer focus to the searching task. This would also allow the on-site members of the structures team to feed-back their assessment as to whether the effort is likely to succeed.

This investigation would have been greatly assisted in coming to a satisfactory conclusion in a timely manner by the availability of increased recorded data, either in the form of a more comprehensive list of FDR parameters or video recordings.



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