



National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: May 22, 2008

In reply refer to: A-08-22 through -24

The Honorable Robert A. Sturgell
Acting Administrator
Federal Aviation Administration
Washington, D.C. 20591

On March 22, 2008, a Boeing 757-225, N921UW, operated by US Airways as flight 1250, experienced an in-flight separation of the left upper wing fixed trailing edge panel during cruise flight at 27,000 feet en route from Orlando, Florida, to Philadelphia, Pennsylvania. The panel struck several windows toward the middle of the aircraft, cracking the outer pane of one window. The inner pane of this window was undamaged, and the pressurization of the aircraft was not compromised. No emergency was declared, and the airplane landed at Philadelphia International Airport about 30 minutes after the separation occurred. None of the 174 passengers or 6 crewmembers was injured. The panel has not been recovered. Visual meteorological conditions prevailed at the time of the incident for the 14 *Code of Federal Regulations* Part 121 scheduled passenger flight, which was operating on an instrument flight rules flight plan.

The B757 upper wing fixed trailing edge panel is a rectangular panel approximately 4 feet by 5 feet. Approximately half of the forward side of the panel is attached to the panel support beam, which is attached to the wing rear spar vertical stiffeners using three support clips and spacers.¹ (See figures 1 and 2.) If these attachment points fail, air can flow under the panel, causing it to lift off the wing and separate. The National Transportation Safety Board's investigation of this incident is ongoing; however, examination of the left wing revealed that the three support clips had fatigue cracks, and the mechanic who removed the clips reported that no spacers had been installed. Additionally, the clips were oriented incorrectly.

On April 28, 1988, Boeing issued Service Bulletin (SB) 757-57-0027, recommending that operators of B757 airplanes inspect the support clips for evidence of cracking. The SB recommended that, if, cracks were apparent, operators should immediately replace the support

¹ The panel is riveted to the substructure at the aft and outboard sides and tucked underneath the wing-to-body fairing along the entire length of the inboard side. About half the forward side is attached directly to the upper wing skin with hi-lok fasteners.

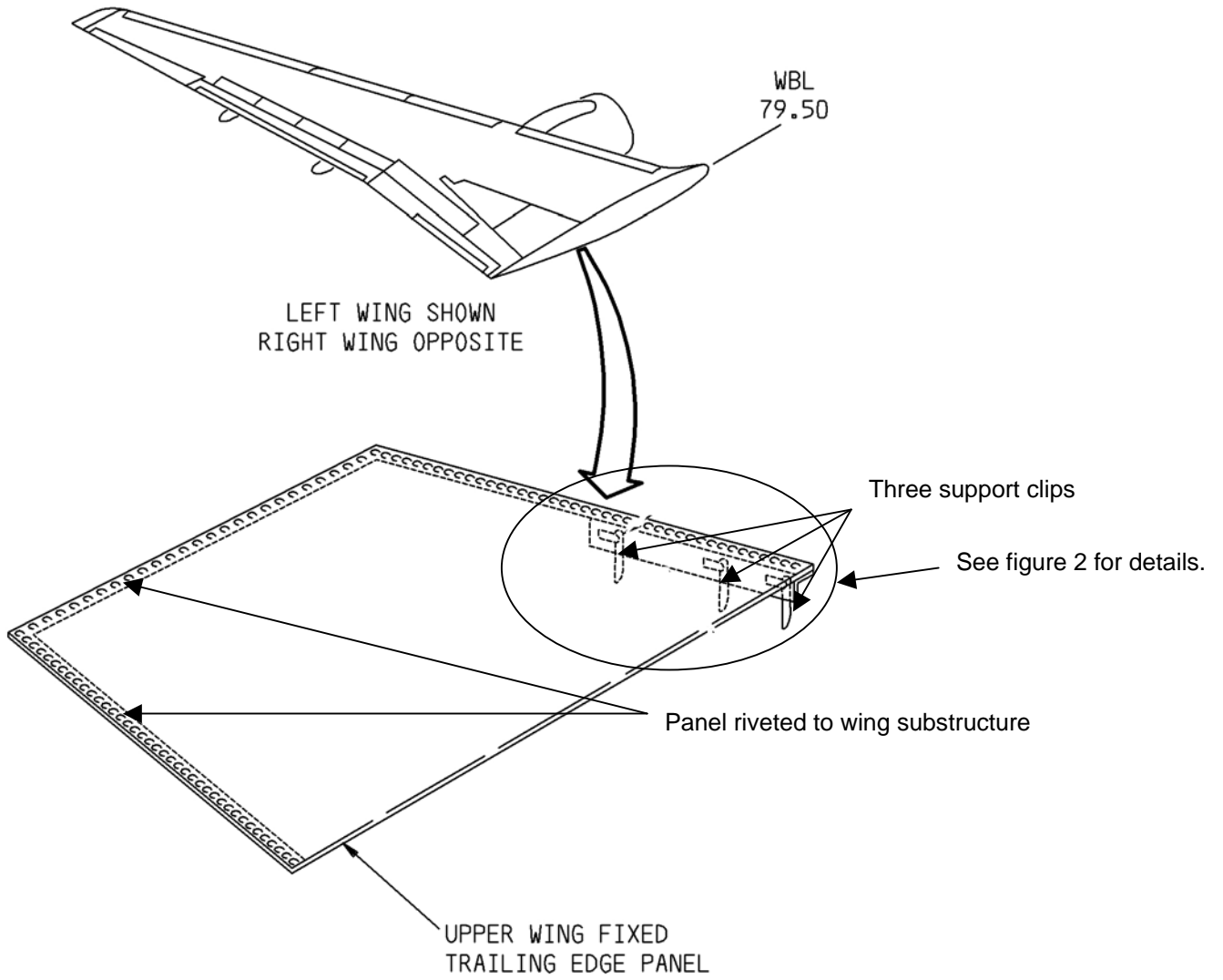


Figure 1. Boeing 757 upper wing fixed trailing edge panel

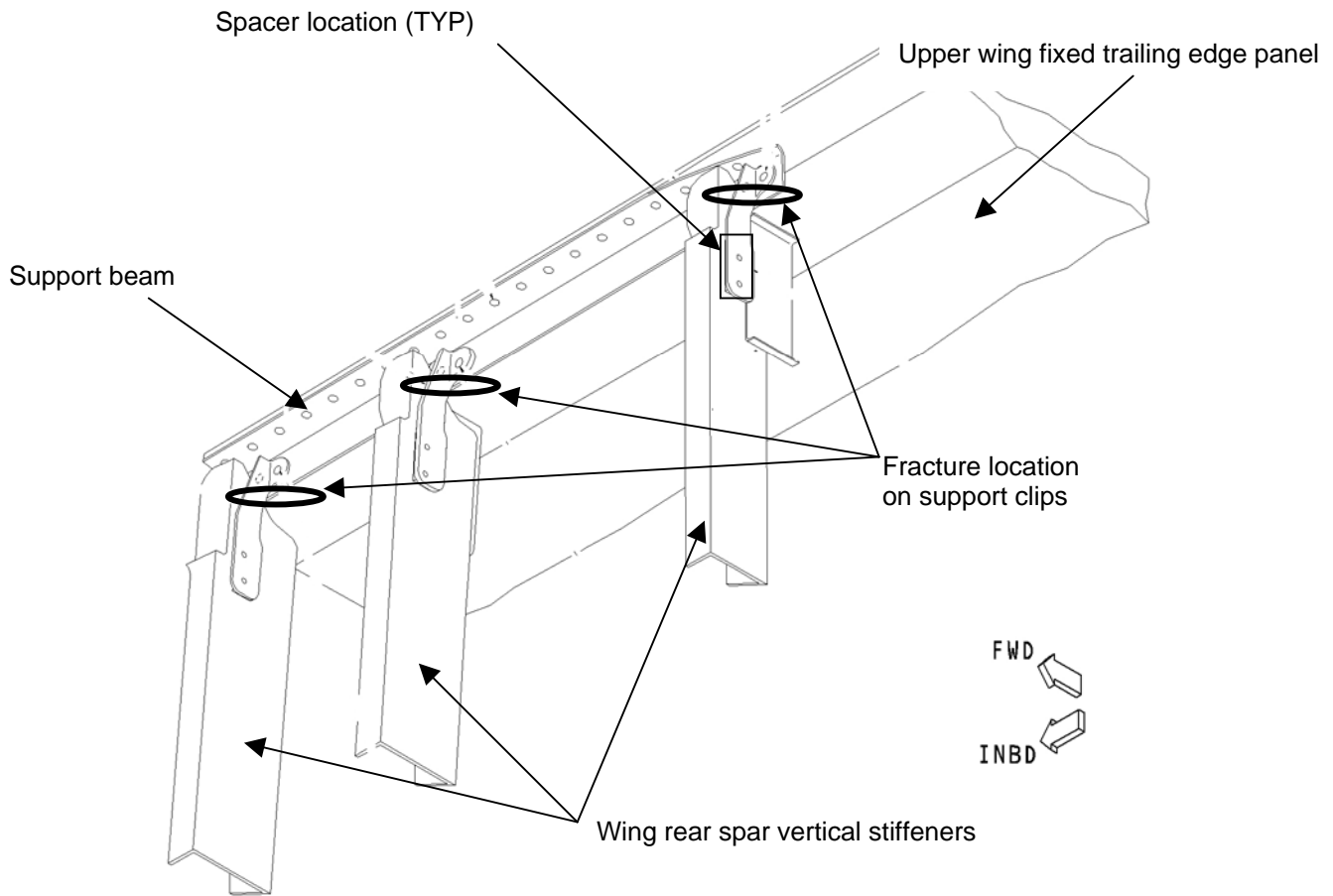


Figure 2. Panel support beam, three support clips, fracture locations & spacer locations

clips. Further, within 3,000 landings, the SB recommended that operators replace all support clips with new clips and spacers to improve fatigue life. Spacers were not present in the original design. On March 15, 1990, Boeing issued SB 757-57-0027, Revision 1, which provided a new replacement kit and increased the list of airplanes affected.² The SB also provided two acceptable clip orientations, depending on the repair kit used.³ According to US Airways, cracked clips on the incident airplane were replaced on April 11, 1990.⁴ However, postincident examination of the airplane revealed that the clips were not oriented correctly and that there were no spacers, which does not conform to the installation configuration recommended in the SB.

On October 23, 1990, the Federal Aviation Administration (FAA) issued Airworthiness Directive (AD) 90-20-12, mandating compliance with SB 757-57-0027. On August 9, 1991, FAA issued AD 91-14-21, which superseded AD 90-20-12 and required compliance with SB 757-57-0027, Revision 1. The AD required operators to perform a detailed visual inspection for cracks in the support clips before the accumulation of 600 landings, or within 30 days after

² Revision 2 was issued on November 14, 1991, and further increased the list of airplanes affected.

³ The repair kits were specific to the line number of the airplane. All clips had to be mounted on either the inboard or outboard side of the support beam with spacers.

⁴ At the time of replacement, the incident airplane was operated by Eastern Airlines. The airplane was sold to US Airways in November 1991.

October 23, 1990, whichever occurred later, and thereafter at intervals not to exceed 600 landings. Any cracked clips were to be replaced. Further, the AD required operators who had not yet complied with the SB, within 3,000 landings after October 23, 1990, to replace all the affected clips with clips and spacers in compliance with the SB. Once this was done, no further action was required.

Following the flight 1250 incident, US Airways inspected 18 other B757s that were subject to the AD. A total of 11 cracked clips were found, affecting 7 airplanes. Of the 11 cracked clips, 9 clips (on 5 airplanes) were oriented incorrectly (based on the repair kit used), whereas 2 clips (on 2 airplanes) were oriented correctly. All cracked clips were installed on the aircraft during the early 1990s. US Airways also found one additional airplane with clips installed incorrectly, but the clips were not cracked. US Airways did not record whether spacers were found on any of the 18 airplanes, but, as stated earlier, US Airways reported that no spacers were found on the incident airplane; Boeing stated in its SB that spacers are critical to improved fatigue life of the support clips. The Safety Board concludes that the cracked clips could be the result of incorrect orientation of the clips, aging of the clips, lack of spacers, or a combination of all three.

The Safety Board is concerned that there may be other B757s with cracked and/or improperly oriented clips or lack of spacers, which could lead to support clip failure and a wing fixed trailing edge panel separation. A wing fixed trailing edge panel that separates from the aircraft in flight could impact the tail of the airplane, resulting in the potential loss of controlled flight, or could damage the windows or fuselage, resulting in possible rapid depressurization of the aircraft. Because substantial structural damage can result from an in-flight separation of the wing fixed trailing edge panel, it is imperative that operators ensure that the clips are not cracked and are oriented properly with spacers. Therefore, the Safety Board recommends that the FAA require operators of B757 airplanes to conduct a one-time visual inspection of the upper wing fixed trailing edge panel support beam clips for cracks, proper orientation, and spacers, and to replace cracked clips and reinstall any clips that are improperly oriented or that lack spacers, in accordance with SB 757-57-0027, Revision 2. When Boeing issued SB 757-57-0027, Revision 2 (which expanded the list of airplanes affected), the FAA did not issue a superceding AD. While all of US Airways' 757 airplanes fell under Revision 1, the Board is concerned that there may be operators who did not comply with Revision 2 of the SB because it was not mandatory. Therefore, it is imperative that the FAA specify that operators must comply with Revision 2.

Because of the confounding factors associated with the clips' improper orientation, the lack of data on the presence of spacers, and the age of the clips, the Safety Board could not determine what role each factor may have played in the cracked clips on US Airways' airplanes. Therefore, the Board is uncertain whether replacing the clips with new clips and spacers and correcting the orientation is sufficient to ensure that the clips do not suffer from fatigue cracks over time. If fatigue cracks can form when spacers are used and when the clips and spacers are oriented correctly, a repetitive inspection of the clips may be necessary. Therefore, the Safety Board recommends that the FAA require operators to report any cracked clips found during the one-time inspection, as requested in Safety Recommendation A-08-22, as well as the part number and orientation of the clips relative to the wing rear spar vertical stiffeners and whether spacers were present, then analyze this information to determine if repetitive inspections are required.

Seven of US Airways' 19 B757 airplanes (the incident airplane and the 6 that were found during postincident inspection) had clips that were incorrectly oriented. Given this high percentage of errors, the incorrect installations were not likely a result of one mechanic's error. Rather, an underlying cause may have led to the installation errors. During its review of the SB, the Safety Board found that the diagrams associated with the orientation of the new clips were numerous and complex. For example, there were two different kits that could be used (depending on the line number of the airplane), and each kit required a different set of figures, which showed the orientation of the clips and spacers on the vertical stiffeners. However, neither figure clearly identified the replacement kit to which the figure applied (both figures had the same title; information about the applicable kit was only found in the instructions). Further, in some figures, it was not readily apparent whether the clips should be installed inboard or outboard of the wing rear spar vertical stiffeners. While we have recommended that reinstallation of clips and spacers be performed in compliance with the SB 757-57-0027, Revision 2, the Board is concerned that, when operators attempt to comply with this SB, the same installation errors that were made when the SB and AD were issued may be made again. Therefore, the Safety Board recommends that FAA require Boeing to issue more explicit instructions and figures that clearly illustrate the correct orientation of the clips and spacers that attach the 757 panel support beam to the wing rear spar vertical stiffeners.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

Require operators of Boeing 757 airplanes to conduct a one-time visual inspection of the upper wing fixed trailing edge panel support beam clips for cracks, proper orientation, and spacers, and to replace cracked clips and reinstall any clips that are improperly oriented or that lack spacers, in accordance with Boeing Service Bulletin 757-57-0027, Revision 2, dated November 14, 1991. (A-08-22)

Require operators to report any cracked clips found during the one-time inspection, as requested in Safety Recommendation A-08-22, as well as the part number and orientation of the clips relative to the wing rear spar vertical stiffeners and whether spacers were present; then analyze this information to determine if repetitive inspections are required. (A-08-23)

Require Boeing to issue more explicit instructions and figures that clearly illustrate the correct orientation of the clips and spacers that attach the Boeing 757 panel support beam to the wing rear spar vertical stiffeners. (A-08-24)

In response to the recommendations in this letter, please refer to Safety Recommendations A-08-22 and -24. If you would like to submit your response electronically rather than in hard copy, you may send it to the following e-mail address: correspondence@ntsb.gov. If your response includes attachments that exceed 5 megabytes, please e-mail us asking for instructions on how to use our Tumbleweed secure mailbox procedures. To avoid confusion, please use only one method of submission (that is, do not submit both an electronic copy and a hard copy of the same response letter).

Chairman ROSENKER, Vice Chairman SUMWALT, and Members HERSMAN, HIGGINS, and CHEALANDER concurred with these recommendations.

[Original Signed]

By: Mark V. Rosenker
Chairman