Address Noncompliant Evacuation Slide Components on Boeing Airplanes

Introduction

The National Transportation Safety Board (NTSB) is providing the following information to urge Boeing and the Federal Aviation Administration (FAA) to take action on the safety recommendations in this report addressing the failure of an evacuation slide to deploy normally during an emergency evacuation. We identified this issue during our ongoing investigation of an emergency landing involving FedEx flight 1376, a Boeing 757-236, in Chattanooga, Tennessee. The NTSB is issuing three safety recommendations to Boeing and four safety recommendations to the FAA. Additional actions may be recommended as the investigation proceeds.

Background and Analysis

On October 4, 2023, about 2347 eastern daylight time, the flight crew of FedEx flight 1376, a Boeing 757-236, received an engine indication and crew alerting system message indicating a failure of the left hydraulic system shortly after takeoff from Chattanooga Metropolitan Airport-Lovell Field (CHA), Chattanooga, Tennessee.[1] The flight crew turned the airplane back to CHA but was unable to lower the landing gear. After multiple attempts to extend the gear were unsuccessful, the crew declared an emergency and performed an emergency gear up landing.[2] After the airplane came to a complete stop, the flight crew performed the evacuation checklist in the Quick Reference Handbook, and a jumpseat occupant onboard the airplane attempted to open the left (L1) door. The door rotated halfway open but would not open fully, and the slide did not deploy.

[1] Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case number DCA24FA002). Use the CAROL Query to search safety recommendations and investigations.

[2] During the emergency landing, the flight crew was unable to stop the airplane, and it slid off the departure end of runway 20, impacted localizer antennas, and came to rest about 830 ft beyond the end of the runway.

The jumpseat occupant then attempted to open the right (R1) door, but it lodged on the slide pack.[3] The jumpseat occupant used force to open the R1 door, and the slide deployed normally (see figure 1). The flight crew and the jumpseat occupant exited the airplane via the R1 door and slide. Both flight crewmembers and the jumpseat occupant were uninjured. The event was classified as an accident because the airplane sustained substantial damage. The flight was operating under the provisions of Title 14 *Code of Federal Regulations* Part 121 as a non-scheduled domestic cargo flight from CHA to Memphis International Airport (MEM), Memphis, Tennessee.

Figure 1. Airplane in its final resting position, with the R1 slide deployed. (Source: Federal Aviation Administration)

Preliminary findings from the NTSB's ongoing investigation indicate different reasons for the jumpseat occupant's difficulty opening the L1 and R1 doors to deploy the respective evacuation slides. Postaccident examination of the R1 door found that the R1 bannis latch (which releases the slide pack when an armed door is opened) did not conform to the then-current configuration of the release cable assembly. Specifically, the assembly is supposed to have three links added with two spacers and hardware, as required by FAA Airworthiness Directive (AD) 86-09-09 by reference to

[3] A slide pack consists of the slide, emergency equipment, and an inflation bottle folded together to fit into the compartment at the bottom of each door. When the door is armed and then pushed open, a latch pulls the slide pack open, deploying the slide.

Boeing Service Bulletin (SB) 757-25A0058, dated April 18, 1986 (see figure 2).[4] Instead, the R1 bannis latch on the accident airplane had only one link and lacked other required hardware (see figure 3), which caused the slide pack to jam before the jumpseat occupant was eventually able to force the door to open. Postaccident examination of the L1 door found that, although its bannis latch conformed to required modifications, the deployment strap was incorrectly routed, which prevented the door from opening.

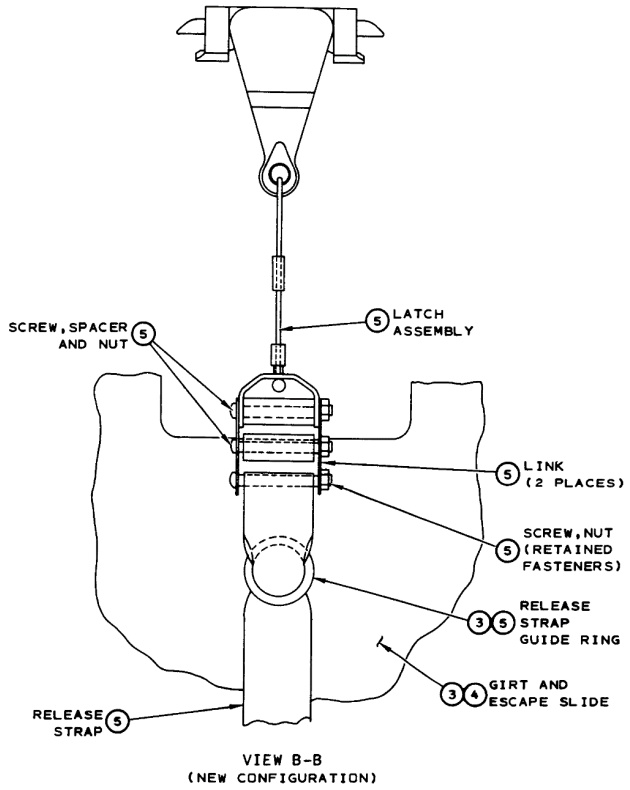

Figure 2. Boeing SB 757-25A0058 modifications of slide pack release cable assembly required by AD 86-09-09. (Source: Image Copyright © Boeing. Reproduced with permission.)

[4] Issued May 30, 1986, AD 86-09-09 was prompted, in part, by evacuation delays following the 1985 uncontained engine failure and fire during takeoff involving a chartered British Airtours 737-236 at Manchester International Airport. The United Kingdom's Air Accidents Investigation Branch (AAIB) found that evacuation delays due to door malfunction (related to the original configuration of the bannis latch, which did not have links and spacers) and restricted access to the exits was a major cause of the 55 fatalities (AAIB 1988). Later testing confirmed that 757 airplanes were susceptible to the same door/slide malfunction. AD 86-09-09 required operators of Boeing 757-200–series airplanes to modify the escape slide pack release cable assemblies for the L1, L2, R1, and R2 doors. The modification was intended to prevent the slide pack container from opening and jamming the doorway and inhibiting the outward motion of the door. The required modification removed the thimble from the original assembly and added the links and hardware, thus increasing the overall length of the latch assembly itself but not increasing the cable length.

Figure 3. Exemplar bannis latch (left) with three links and accident airplane R1 bannis latch (right) with one link

After the CHA accident, FedEx inspected the L1 and R1 doors on the 97 other airplanes in its Boeing 757 fleet and found no other instances of a misrouted deployment strap. However, the inspection found 46 doors (about 24%) that were not compliant with either AD 86-09-09 or AD 2001-15-01 (applicable to Boeing 727, 737-100 through -800, and 757-200, -200CB, and -300 series airplanes because these models used the same bannis latch design).[5] AD 2001-15-01 required bannis latch modifications recommended in two other Boeing SBs applicable to 757 airplanes (757-25A0108 and 757-25-0217).[6] The diagrams in each successive AD and SB

[5] FedEx does not have Boeing 727s or 737s in its fleet. As of March 12, 2025, Cirium Fleets Analyzer, a commercial database with more than 450,000 unique aircraft records across over 770 aircraft types, indicated the following in-service Boeing airplanes in the United States: 349 Boeing 757s, 1,470 Boeing 737s, and 5 Boeing 727s.

[6] Following a determination that the bannis latch release cable in the original assembly was prone to fraying, Boeing issued SB 757-25A0108 in 1991 recommending that the cable be replaced with a chain and soldered split ring. In May 2000, Boeing issued SBs 757-25-0217 and -0218 recommending replacement of the soldered split ring with a clevis and rivet to reduce the possibility of

indicated the modifications to the configuration covered in that document but missed parts of prior modifications so that none of the diagrams were fully correct. As a result of FedEx's fleet inspection findings, Boeing issued a multi-operator message (MOM-MOM-24-0199-01B[R1]) on April 8, 2024.[7] Boeing subsequently received notification from a non-US operator that its inspection of four 757 doors found three with bannis latches that did not comply with ADs 86-09-09 and 2001-15-01.

The accident airplane was manufactured in 1988 and should have been delivered with bannis latches that complied with AD 86-09-09.[8] It is currently unknown why noncompliant components were present at the time of the accident. The accident airplane was operated by multiple carriers before FedEx acquired it, and the NTSB does not have maintenance records for these other carriers. FedEx records indicate that the bannis latch was inspected on January 12, 2023. The work card indicated to check the cables for fraying. At that time, there should have been a chain in the latch assembly and not a cable. Although the R1 door was eventually opened despite the incorrectly configured latch, the NTSB is concerned that it hindered an emergency evacuation.

The NTSB's review of the Boeing 757 and FedEx aircraft maintenance manuals (AMMs) and the Boeing illustrated parts catalog (IPC) found that all contained inconsistent depictions of the bannis latch configuration as required by ADs 86-09-09 and 2001-15-01. For example, the illustrations shown in figures 4 and 5 depict different versions of the release assembly and both the three- and one-link configurations, circled on each illustration. Both illustrations in figure 4 indicate a cable rather than the required chain, and the inset image to the right of each full image indicates a single link rather than the required three links. The illustration from the Boeing IPC in figure 5 displays both the chain configuration (correct) and the cable and thimble configuration (incorrect), and both the single-link configuration (incorrect) and the three-link configuration (correct). It is also noted that Boeing does not have a single part number that covers the entire latch assembly. The current part number includes both the one-link and the three-link configurations.

unintended release of the escape slide and to avoid slide deployment failures caused by corroded spring pins and unserviceable split rings.

[7] MOM-MOM-24-0199-01B[R1] superseded MOM-MOM-24-0199-018, issued March 19, 2024. The original MOM notified operators to inspect the door 1 and door 2 escape slide latch assemblies for the proper configuration. The updated MOM contained updated summary text and additional references.

[8] To obtain an airworthiness certificate, the accident airplane was required to be compliant with AD 86-09-09 at the time it was manufactured.

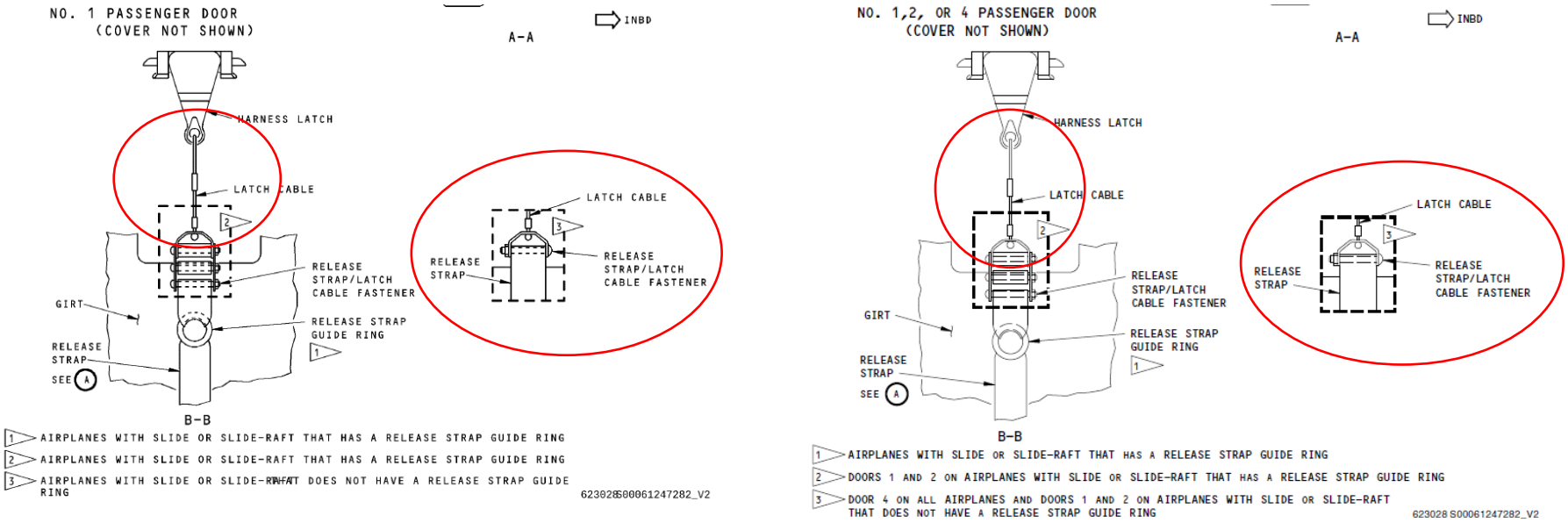

Figure 4. Boeing 757 bannis latch configuration in the FedEx AMM (left) and Boeing AMM (right). (Source: Image Copyright © Boeing. Reproduced with permission.)

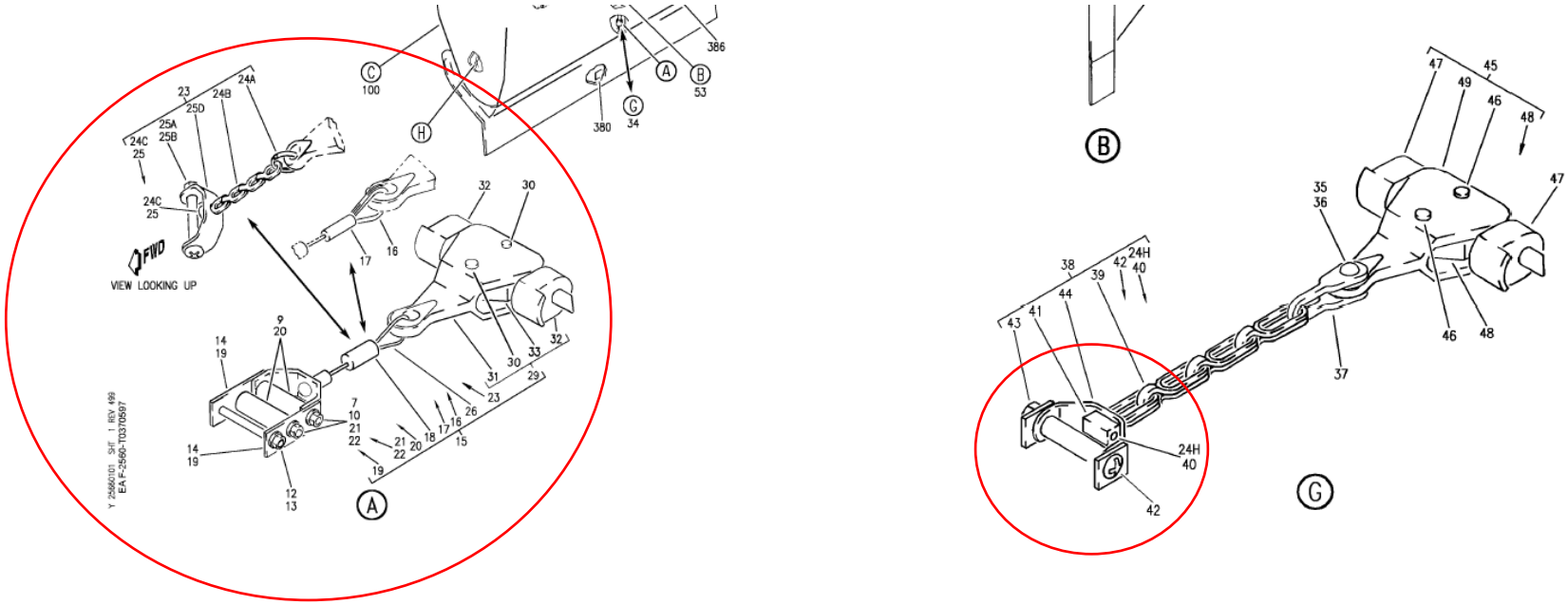

Figure 5. Boeing 757 bannis latch configuration in Boeing illustrated parts catalog. (Source: Image Copyright © Boeing. Reproduced with permission.)

None of these resources depict the bannis latch with all required modifications. These inconsistent, conflicting depictions would likely be confusing to maintenance personnel and could lead to the installation of and failure to detect nonconforming latches, which could result in another incident of an evacuation slide not deploying properly when needed. After the NTSB urged Boeing to look into the high incidence of noncompliant in-service bannis latches that were identified during FedEx's fleet inspection, Boeing's revision groups for the 757 AMM and IPC reached a consensus that the correct hardware for the bannis latch assembly could be clarified. Boeing anticipates releasing updates to the AMM and IPC in May 2025 to provide a consistent and accurate depiction of the bannis latch assembly.

Given the results of FedEx's fleet inspection after the CHA accident, the NTSB concludes that unairworthy bannis latches that don't comply with ADs 86-09-09 and 2001-15-01 may be installed on other in-service Boeing 757-200, -200CB, and -300 series airplanes, which could lead to delayed evacuation during an emergency should the slide become jammed. Therefore, the NTSB recommends that, once the Boeing 757 AMM and IPC are updated to provide a consistent and accurate depiction of the bannis latch assembly, Boeing issue an SB advising Boeing 757 operators to inspect and, if necessary, modify or replace the bannis latches on Boeing 757-200, -200CB, and -300 series airplane with the correct configuration. The NTSB also recommends that the FAA require all Boeing 757 operators to inspect the bannis latches on Boeing 757-200, -200CB, and -300 series airplane doors and, if necessary, modify or replace them so they comply with the correct configuration.

The NTSB further concludes that, because the same bannis latch design used on certain Boeing 757 airplanes (757-200, -200CB, and -300 series) is also used on Boeing 727 and 737 airplanes, these airplane models could also have bannis latches installed that are not the correct configuration. Therefore, the NTSB recommends that Boeing issue an SB advising operators of Boeing 727 and 737 airplanes that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to inspect those airplanes and, if necessary, modify or replace the bannis latches with the correct configuration. The NTSB also recommends that the FAA require all operators of Boeing 727 and 737 airplane models that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to inspect and, if necessary, modify or replace the bannis latches as advised in the Boeing SB recommended in Safety Recommendation A-25-8.

The NTSB also concludes that ensuring operators' maintenance documentation contains consistent, accurate depictions of the correct configuration of the bannis latch assembly would help prevent the use of noncompliant components that could lead to delayed evacuation during an emergency should the slide become jammed. The NTSB airplane AMMs in accordance with the revised Boeing therefore recommends that the FAA require all Boeing 757 operators to update their Boeing 757-200, -200CB, and -300 series AMM and IPCs.

The NTSB further recommends that Boeing review all pertinent AMMs and IPCs for Boeing 727 and 737 model airplanes that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to ensure they consistently and accurately depict the correct configuration of the bannis latch assembly for those Boeing airplane models, revise these manuals as needed, and notify affected operators about the manual revisions. Finally, the NTSB recommends that the FAA require all operators of Boeing 727 and 737 airplane models that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to update their AMMs in accordance with the revised Boeing AMMs and IPCs recommended in Safety Recommendation A-25-9.

Conclusions

Findings

Unairworthy bannis latches that don't comply with Airworthiness Directives 86-09-09 and 2001-15-01 may be installed on other in-service Boeing 757-200, -200CB, and -300 series airplanes, which could lead to delayed evacuation during an emergency should the slide become jammed.

Because the same bannis latch design used on certain Boeing 757 airplanes (757-200, -200CB, and -300 series) is also used on Boeing 727 and 737 airplanes, these airplane models could also have bannis latches installed that are not the correct configuration.

Ensuring operators' maintenance documentation contains consistent, accurate depictions of the correct configuration of the bannis latch assembly would help prevent the use of noncompliant components that could lead to delayed evacuation during an emergency should the slide become jammed.

Recommendations

New Recommendations

As a result of this investigation, the National Transportation Safety Board makes the following new safety recommendations.

To the Federal Aviation Administration:

Require all Boeing 757 operators to inspect the bannis latches on Boeing 757-200, -200CB, and -300 series airplane doors and, if necessary, modify or replace them so they comply with the correct configuration. (A-25-3)

Require all operators of Boeing 727 and 737 airplane models that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to inspect and, if necessary, modify or replace the bannis latches as advised in the Boeing service bulletin recommended in Safety Recommendation A-25-8. (A-25-4)

Require all Boeing 757 operators to update their Boeing 757-200, -200CB, and -300 series airplane aircraft maintenance manuals (AMM) in accordance with the revised Boeing AMM and illustrated parts catalogs. (A-25-5)

Require all operators of Boeing 727 and 737 airplane models that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to update their aircraft maintenance manuals (AMM) in accordance with the revised Boeing AMMs and illustrated parts catalogs recommended in Safety Recommendation A-25-9. (A-25-6)

To Boeing:

Once the Boeing 757 aircraft maintenance manual and illustrated parts catalog are updated to provide a consistent and accurate depiction of the bannis latch assembly, issue a service bulletin advising Boeing 757 operators to inspect and, if necessary, modify or replace the bannis latches on Boeing 757-200, -200CB, and -300 series airplane with the correct configuration. (A-25-7)

Issue a service bulletin advising operators of Boeing 727 and 737 airplanes that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to inspect those airplanes and, if necessary, modify or replace the bannis latches with the correct configuration. (A-25-8)

Review all pertinent aircraft maintenance manuals and illustrated parts catalogs for Boeing 727 and 737 model airplanes that use the same bannis latch design as Boeing 757 airplanes (757-200, -200CB, and -300 series) to ensure they consistently and accurately depict the correct configuration of the bannis latch assembly for those Boeing airplane models, revise these manuals as needed, and notify affected operators about the manual revisions. (A-25-9)

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Report Date: March 27, 2025

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