



U.S. Department
of Transportation
**Federal Aviation
Administration**

SAFO

Safety Alert for Operators

SAFO 08013
DATE: 5/29/08

Flight Standards Service
Washington, DC

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo

A SAFO contains important safety information and may include recommended action. SAFO content should be especially valuable to air carriers in meeting their statutory duty to provide service with the highest possible degree of safety in the public interest. Besides the specific action recommended in a SAFO, an alternative action may be as effective in addressing the safety issue named in the SAFO.

Subject: Safety Recommendation Concerning Piper PA-23 and PA-31 Series Nose Baggage Doors

Purpose: Provide operators of Piper PA-23 and 31 series aircraft with recommendations for preventing the forward baggage door from opening in flight.

Background: January 5, 2008, a Piper PA-31-350 crashed, fatally injuring 6 passengers, and injuring 4 passengers. August 17, 2001, a pilot aborted a takeoff due to a warning light. November 27, 1997, a PA-23-250 crashed on takeoff, fatally injuring 4 passengers. May 24, 1996, a Piper PA-31-350 crashed injuring 4 passengers. April 16, 1990, a Piper PA-31-350 crashed shortly after takeoff. January 17, 1982, a Piper PA-31T crashed after takeoff. What do these accidents have in common? They all involved the inadvertent opening of the nose baggage door either during take-off or during flight.

Discussion: Over time, the nose baggage doors latches can become worn or damaged. For the PA-23, PA-31 and PA-31T, Piper Aircraft Service Bulletin 604A attempted to address this situation by addressing the installation of two (2) rivets, part number 22613-00, to hold the two latch arms (forward arm assembly and aft arm assembly) in place. This service bulletin also warns, "However, it is possible to close the door and turn the lock to the locked position without the lock tang actually engaging the door handle. As a result, the door would not be properly secured and could possibly come open in flight; this could adversely affect the flight characteristics of the airplane."

Note: FAA Aircraft Certification is currently working with Piper Aircraft to develop additional certification requirements pertaining to this issue. Until such time as the additional requirements are published, operators should consider the recommendations contained herein.

Recommendations: Title 14 Code of Federal Regulations, part 135 Directors of Operations, Chief Pilots, Pilots, training centers and instructors involved in the operation or training in Piper PA-23 and PA-31 series aircraft should become familiar with and consider adopting the recommendations contained in the supplement located at the following link:

http://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/media/2008/SAFO08013SUP.pdf

Document Cancellations: This SAFO does not supersede any past, present, or future, Airworthiness Directives or aircraft manufacture's Service Bulletin, but rather assists air carriers in operating at the highest levels of safety when identified safety concerns are identified.

Questions: For any questions pertaining to this SAFO, please contact the Air Transportation Division's part 135 Air Carrier Operations Branch, AFS-250 at (202) 267-8166.

Supplement to Safety Alert for Operators (SAFO) #08013

Recommendations

Recommendations: Title 14 Code of Federal Regulations (14 CFR), part 135 Directors of Operations, Chief Pilots, Pilots, training centers and instructors involved in the operation or training in Piper PA-23, PA-31 and PA-31 series aircraft should become familiar with and consider adopting the following recommendations:

1. Operators should develop procedures to routinely inspect the baggage door and associated latches and locks during the normal aircraft inspection process. This inspection should include an inspection of the Baggage Door Bracket, part number 28467-03, for deformity and wear, which can allow a failure by the crew to correctly secure the nose baggage door, allowing the door to open during take-off or in flight. During routine inspections, this bracket has been found to be bent or deformed. Either condition contributes to the failures that have been reported as the cause of several fatal accidents. Such inspection would require maintenance personnel to remove the cover panel (P/N 40198-03 or P/N 40197-00), located on the inside of the forward baggage door, allowing the maintenance personnel to gain access to the baggage door handle system. The baggage door bracket P/N 28467-03 should be removed and inspected for deformation and wear. The cam for the door lock assembly P/N 752 350, should also be inspected to assure proper engagement with the baggage door handle. Any damaged part must be replaced or the baggage door be secured (unable to be opened), in accordance with the operators approved minimum equipment list, and a log book entry made before the aircraft is returned to service. Any damaged part must be repaired or replaced in accordance with 14 CFR part 135, § 135.413 before the aircraft is returned to service.

2. The operator's training programs should ensure that flight crews, ground handlers, and maintenance personnel understand the proper operation of the forward baggage door. When closing the baggage door handle, it is necessary to press the handle into the slot and turn the key so the cam on the lock assembly engages the open/close handle correctly. Caution should be taken when closing and locking the baggage door, not to exert excessive pressure when pushing the handle into the slot or turning the key and engaging the cam, preventing damage to the handle/locking assembly.

Note: The baggage door key should only be allowed to be removed when the lock is fully engaged or fully disengaged. The operator's pilot training program should include emergency procedures training on how to react should a baggage door open during take-off or in flight. The training should include a description of what to expect such as noise, vibration, handling, and potential secondary damage from baggage hitting props.

3. Operators need to remove any "permanent key" installations. This defeats the safety feature of having a removable key. The key can only be removed when the lock is either totally open or completely engaged. With a "permanent Key" installed, the lock is free to rotate.

4. Make sure latch and lock mechanisms conform to original type design and are in a condition for safe operation.

Q. Was the forward baggage door modified on any of the accident aircraft?

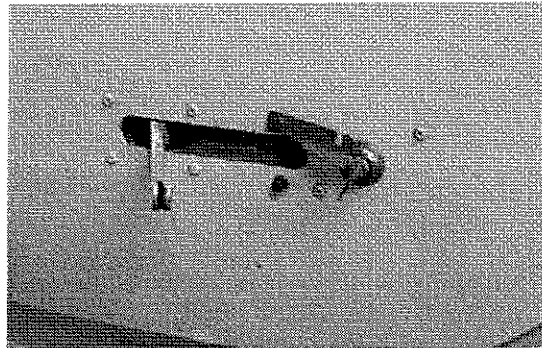
A. Yes, according to Piper's on site investigator, who reported on one of the accident aircraft:

"...the key lock appears to have been replaced by some type of butterfly looking [Locking?] lever. When lever is turned approximately 90° it is supposed to lock the door just like a key would. Lever was found in about the 70° position. At this time the inside cover for the latching mechanism has not been found."

There is no evidence of an STC or Form 337 approving this modification in the aircraft airworthiness records in Oklahoma City.

Q. Have other PA-31 forward baggage doors been modified?

A. Yes, Anchorage Aircraft Certification Office (ACO) reports that other Alaskan operators have adapted the latch modification pictured below.



Q. Have any other PA-31 forward baggage doors opened in flight?

A. Yes, there have been nine incidents and accidents as noted below.

September 24, 1977 – PA-31B, N103TA crashed shortly after takeoff from Lake Minchumia, Alaska, after the forward baggage door popped open. This accident prompted the NTSB to issue safety recommendation A-78-4. No injuries. NTSB identification ANC77FA090.

April 27, 1979 – PA-31, N66871 had the nose baggage door come open on the takeoff run. A bag hit and broke the propeller. The pilot was able to stop the airplane. No injuries.

January 17, 1982 – PA-31T, N91TW the forward nose baggage door opened during initial climb from Delta, Utah. The airplane lost speed, stalled, and crashed. The door was found in the unlocked position. Two injuries. NTSB identification DEN82FA020.

June 1, 1982 – PA-31, N4091U had the nose bag door come open on takeoff. Baggage fell out into propeller. The pilot made an emergency landing. There was a defective door lock. No injuries.

November 17, 1983 – PA-31, N63589 had a loud bang near the engine and the takeoff was aborted. The nose baggage door was locked but open. A bracket that holds the door was broken. No injuries.

September 21, 1988 – PA-31-310, N251CA had a loud bang and the nose baggage door light came on. A precautionary landing was made. The door was found ajar and there was minor damage to the nose. No injuries.

April 16, 1990 – PA-31-350, N4109E had the baggage door open on climb after takeoff from Deadhorse, Alaska. The engine cover separated and damaged the horizontal stabilizer. Examination of the door revealed the locking spring was missing and the latching mechanism had been modified to include a non-approved safety device. The operator did not require the door be locked. No injuries. NTSB identification ANC90LA062. This the first of two incidents involving the baggage door on N4109E.

December 2, 1993 – PA-31T, N515WB had an airframe failure in a dive. It appears the baggage door opened and the pilot lost control. The plane was observed in a flat spin. The props were found feathered. Two fatalities. NTSB identification NYC94FA028.

May 24, 1996 – PA-31-350, N4109E had the nose baggage door open on climbout from Point Hope, Alaska. Baggage flew out and struck and destroyed the left propeller. The pilot made an emergency landing on sea ice. Four injuries. NTSB identification ANC96FA078.

Q. What does the Service Difficulty Report (SDR) data base show?

A. The SDR data base contained 27 reports of forward baggage door problems.

Q. Has the FAA previously addressed the doors opening?

A. Yes, the FAA has issued five Aviation Maintenance Alerts in Advisory Circular (AC) 43-16 to improve the reliability and to interchange service experience on these latching and locking mechanisms. Piper also provided service information regarding the baggage door locks.

Piper issued Service Bulletin 604A in June 1979. This Service Bulletin makes available a modification to prevent removal of the baggage door key until the door is properly secured. It also provides instructions for inspection of fasteners that are used to attach the locking arm brackets. These fasteners are steel rivets and the inspection is to ensure the proper set of the rivet heads.

Piper issued Service Bulletin 1174 in February 2007. This bulletin addresses manufacturing problems with replacement lock assemblies on the PA-31 and PA-42 aircraft. On the subject locks, the cam length was too short. Cams that are too short could lead to failure of the locking mechanism.

Q. Has the NTSB issued any recommendations for the PA-31 forward baggage door opening in flight?

A. Yes, the NTSB issued Recommendation A-78-004 in 1978 to:

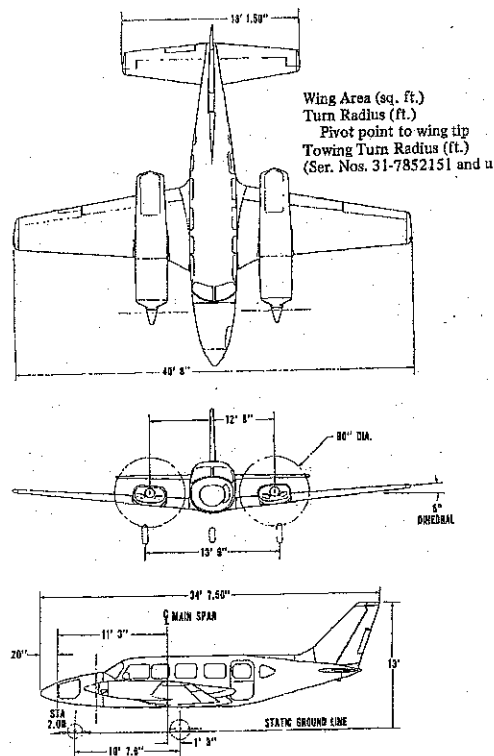
“Issue an Airworthiness Directive applicable to Piper Cheyenne, Navajo, and Aztec airplanes to require a periodic inspection of the forward baggage door locks, and to establish an inspection procedure and repair or replacement requirements. The inspection should insure that the baggage door lock tang will not disengage from the door handle, and that the latching load imposed during handle operation is a specified minimum consistent with dynamic loads which can be encountered during all ground and flight operations.”

Safety Recommendation A-78-004 was classified as "Closed Acceptable Alternate Action." In NTSB letter dated 01/15/1986 the board said:

"The Safety Board finds that the FAA review and analysis of the forward baggage door latch mechanisms on the affected airplanes, combined with the five General Aviation Airworthiness Alerts issued by the FAA to improve the reliability and to interchange service experience on these latching and locking mechanisms complies with the intent of this recommendation. Safety Recommendation A-78-4 has been classified as 'Closed Acceptable Alternate Action.'"

Q. What is the history of the Piper PA-31 Navajo?

A. The Piper PA-31 Navajo was first certificated on February 24, 1966 according to Civil Aviation Regulation (CAR) 3. A total of 4,789 PA-31 airplanes were built. These include ten different model designations ranging from 300 to 350 hp reciprocating engines without pressurization (PA-31, pressurized (PA-31P) and turbine powered airplanes (PA-31T).

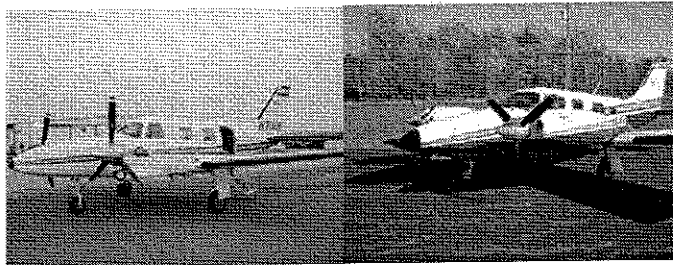


Q. Does the FAA airworthiness standards require demonstration of flight characteristics with the forward baggage door open?

A. No. Neither CAR 3, nor the present part 23, require such a demonstration.

Q. Do any other Piper twin engine airplanes have similar forward baggage doors?

- A. Yes, the PA-42 Cheyenne aircraft have almost identical latching/locking mechanisms. The PA-34 Seneca is similar but uses a rotating handle and bayonet pins rather than a retracting lever and latching arms.



Piper PA-42 Cheyenne

Piper PA-34 Seneca

Q. Have any Piper models with similar forward baggage doors had them open in flight?

- A. Yes, both the PA-23 Aztec and PA-34 Seneca have reports of the forward baggage door opening in flight. There were total of 8 incidents and accidents involving the Aztec with at total of 8 fatalities. The SDR system shows 12 reports. There is a total of 16 incidents and accidents in the Seneca with a total of 4 fatalities. The SDR system shows 46 reports of problems with the forward baggage door. There were no incidents or accidents involving the forward baggage door on the PA-42 Cheyenne and there were no SDR reports filed.

Q. Has the FAA addressed the forward baggage doors opening on these other Piper models?

- A. Yes, both Piper and the FAA have taken actions to prevent in-flight baggage door events. The PA-23 Aztec and PA-42 Cheyenne were addressed by the publication of Aviation Maintenance Alerts as noted previously for the PA-31 series aircraft.

The PA-34 Seneca was addressed by a series of Airworthiness Directives (AD) and manufacturer's service information. At the present time, AD 88-04-05 is still in force and requires inspection, repair, and modification per Piper Service Bulletins 633A and 872. This AD superseded both AD 79-23-01 and 81-10-03.

Piper issued Service Bulletin 633A in June 1979. This bulletin requires inspection of the baggage door lock during preflight and after each flight with a specific inspection procedure. Also required are rigging checks at 25 hour intervals, a one-time modification of the latch plate. Installation of a safety wire in the latch mechanism was recommended in a revision to this bulletin.

Piper issued Service Bulletin 872 in November 1987. This bulletin requires inspection of the condition of the latch mechanism based on reports of damaged or improperly installed latching mechanisms. It also provides notification of latch spring modification that helps keep the latching mechanism engages.

Q. Has the NTSB issued any recommendations for other Piper forward baggage door opening in flight?

- A. Yes, the NTSB issued recommendations A-78-004 and A-87-022 through -024. A-78-004 was noted previously since it also included the PA-31. A-87-022 through -024 applied to the PA-34 Seneca:

Supplement to Safety Alert for Operators (SAFO) #08013

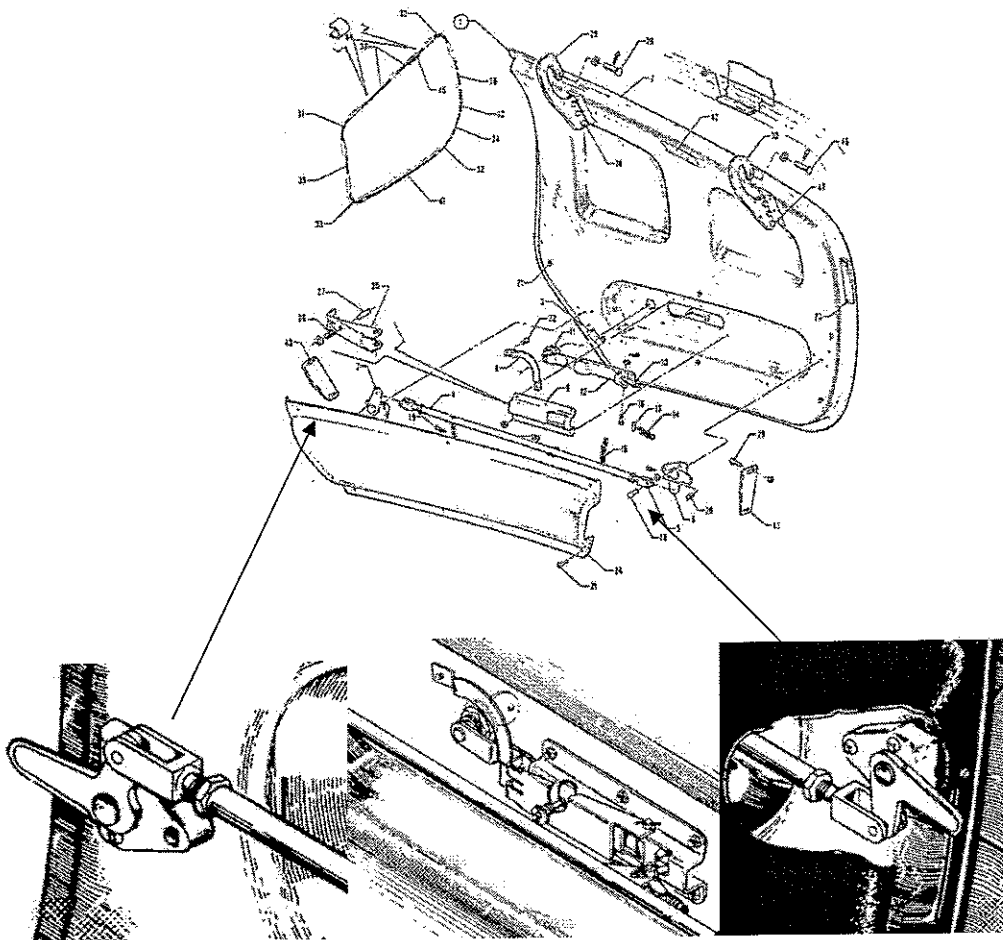
Frequently Asked Questions

Q. How does the forward baggage door work?

A. Some Piper aircraft feature a lockable nose baggage compartment.

In the closed and locked position, the door is secured from opening at 4 locations; 2 gooseneck hinges at the top, and 2 arm assemblies, one at each end of the door (see drawing below). Each arm assembly (installed in the door) has a locking tab that makes contact pressure against the edge of a corresponding fuselage-mounted baggage door plate.

To open the door, a key is inserted into the lock assembly, and turned clockwise. This action rotates a cam plate in the lock assembly clear of the slot in the baggage door handle. The baggage door handle is now free to move. The operator first pushes on the forward part of the handle, which pivots the aft end of the handle outward. The operator then pulls outward on the aft end of the baggage door handle, which is now free to pivot about the handle center. This lever action causes the forward portion of the baggage door handle to rotate inward and aft, and consequently, also causes the baggage door latch tube assembly to move and release the locking tabs.



A-87-22. *"Issue an Airworthiness Directive applicable to all Piper Seneca Model PA-34 series airplanes requiring compliance with Piper Service Bulletin No. 633B, Part I, "Preflight and Postflight Inspection," relating to the forward baggage door, specifically mandating the use of tiedown straps or nets to secure any baggage or other items carried in the nose baggage compartment during flight; and Part II, "Inspection and Rigging Checks," except that these checks need be performed only during annual or 100-hour inspections rather than at 25-hour intervals. These requirements should remain effective until substantial design improvements have been incorporated in the nose baggage door latching/locking mechanisms, as outlined in the succeeding recommendation."*

A-87-23. *"Require the Piper Aircraft Corporation to develop an appropriate design modification that will substantially improve the mechanical reliability and safety of existing Piper PA-34 nose baggage doors. An effort should be made to develop a more positive, reliable locking mechanism and provide for double failure protection through secondary locking devices. The design of a completely new baggage door should also be considered for incorporation on newly manufactured Senecas. The new design, through appropriate location of door hinges and/or stabilizing aerodynamic pressures, should ensure that no degradation of flight control occurs as a result of the door opening (becoming ajar) inflight."*

A-87-022, has been classified as "Closed--Acceptable Alternate Action." Safety Recommendation A-87-023 is classified "Closed--Acceptable Action" as noted in NTSB letter dated 06/28/1988. This decision was based on the FAA letter dated 04/18/1988 which offered that compliance with Piper Service Bulletin 872 would relieve the mandatory inspection requirements proposed in this safety recommendation.