



# National Transportation Safety Board

Washington, D.C. 20594  
Safety Recommendation

log # 2418

Date: April 25, 1994  
In reply refer to: A-94-93 through -95

Honorable David R. Hinson  
Administrator  
Federal Aviation Administration  
Washington, D C. 20591

On March 5, 1992, a Cessna 414, N69662, operating as an air ambulance, crashed while the pilot was maneuvering for an emergency landing after departing the Tri-City Airport, Freeland, Michigan, en route to Chicago, Illinois. Witnesses reported that before departure, while paramedics were boarding the patient, the airplane tipped onto its tail. Afterward, the pilot was told that the airplane was damaged but refused mechanical assistance. Shortly after takeoff, the pilot reported to the control tower that he was returning to land because of a jammed elevator. He subsequently lost control while maneuvering to land and crashed. The airplane was destroyed, and the pilot, flight nurse, and patient were fatally injured. The airplane was being operated under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135 by Airborne Flying Service, Inc., of Hot Springs, Arkansas.

The Cessna 414 airplane has a "tail bumper" mounted underneath the empennage, aligned with the airplane centerline. The tail bumper is designed to offer protection to the airplane whenever the tail strikes the ground. It is also used as an airplane tie-down and to secure the empennage during maintenance. The tail bumper is fabricated from approximately 1/4 inch diameter steel wire, which is formed into a 90° bend. The wire ends are forged flat and drilled to accept a machine screw for attachment to the airplane. The wire bumper is attached with the forward end parallel to the airplane's longitudinal axis so that the corner of the 90° bend at the aft end will contact the ground if the airplane is improperly loaded and prevent damage to the underside of the aft fuselage. The unbalanced load is applied vertically through the wire bumper to the aft attachment point. The elevator control rod passes through the bulkhead directly above the aft attachment point for the bumper. This tail bumper design is incorporated on all Cessna 400 series airplanes.

The examination of the wreckage of N69662 following the accident revealed damage to the empennage that the Safety Board believes was caused by the tail bumper striking the ground when the airplane was being loaded before the accident flight. The tail bumper had been pushed upward, interfering with the elevator control rod and jamming the elevator. The position of the tail bumper would have made control of the airplane very difficult or prevented control altogether. The Safety Board's investigation showed that Cessna 400 series airplane elevator flight controls can be affected, secondary to tail bumper damage, when the airplane's tail bumper

strikes the ground. The Safety Board is not aware of similar problems with other tail bumper designs.

The Safety Board examined eight randomly selected Cessna 400 series airplanes at two Chicago area airports to determine whether Cessna wire tail bumpers were frequently damaged. The examinations revealed damage to the empennage of all eight airplanes at the tail bumper aft attachment. The Safety Board learned, from an article in the March 1992 edition of FLYING magazine titled, "FAA Lawyer Speaks Out," of one other incident involving a Cessna 400 series airplane (besides the accident noted above) where damage caused by a tail bumper ground strike caused elevator control interference.

A review of several Cessna 400 series Aircraft Owner's Manuals (the pre-1976 owner's guide to aircraft systems, operating procedures, service instructions and performance data), disclosed a note (applicable to those airplanes where a wide center of gravity range existed due to differences in installed optional equipment) on "tail tipping" in the "Weight and Balance" section. The note states that, "Under certain passenger loading conditions, it is possible to exceed the aft CG (center of gravity) limits which can lead to tail tipping." The section also includes recommended passenger and cargo loading procedures to prevent this from occurring. However, the current Pilot's Operating Handbook (POH) that replaced the Aircraft Owner's Manual, does not contain recommended passenger or cargo loading procedures; neither does it mention "tail tipping."

In addition to the POH, the Cessna Aircraft Company provides operators with a General Aviation Manufacturer's Association (GAMA) publication called the "Pilot Safety and Warning Supplements," which contains general safety information. The chapter on "Aircraft Loading" addresses improperly loading the airplane and states, "overloading, or misloading, may not result in obvious damage, but could do harm to hidden structure or produce a dangerous situation in the event of an emergency under those conditions."

The Safety Board found that the passenger and cargo loading procedures formerly published in the Cessna Aircraft Owner's Manual were adequate and is concerned about the omission of the loading procedures in the current POH. The Safety Board also believes that the "Pilot Safety and Warning Supplements" understate the hazards associated with the improper loading of a Cessna 400 series airplane and is consequently concerned about the lack of warning about overloading or misloading the airplane and the potential for elevator control interference as a consequence of a tail bumper ground strike. Since neither a note on tail tipping or passenger and cargo loading procedures, nor warnings about improperly loading the airplane are included in the POH, the Safety Board believes that the Federal Aviation Administration (FAA) should encourage the Cessna Aircraft Company to include them in the POH for all Cessna 400 series airplanes. The inclusion should also ensure that pilots are aware that tail tipping may damage the empennage and cause elevator control interference, and advise the pilots to have the damage to the empennage examined by a qualified aircraft mechanic and repaired, if necessary, before further flight.

The Safety Board also believes that the FAA should issue an Air Carrier Operators Bulletin (ACOB) to require that Principle Operations Inspectors (POI) review the training curriculums of the Part 135 Certificate Holders of Cessna 400 airplanes and ensure that they include proper passenger and cargo loading procedures and adequately address the hazards associated with overloading or misloading the airplane. The curriculum should ensure that pilots are aware that tail tipping may damage the empennage and cause elevator control interference and advise the pilots to have the damage to the empennage examined by a qualified aircraft mechanic and repaired, if necessary, before further flight.

Further, the Safety Board believes that the design of the Cessna 400 series airplane tail bumper should be modified to eliminate the potential for elevator control interference should a tail strike occur. The Safety Board is also forwarding a recommendation to the Cessna Aircraft Company regarding the proposed amendment to the POH and a design modification to the tail bumper. The Safety Board believes that these actions will minimize the potential for a loss of control of Cessna 400 series airplanes in flight because of damage to the empennage and interference with elevator controls that have occurred as a result of tail bumper ground strikes.

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

Encourage the Cessna Aircraft Company to amend the Cessna 400 series Pilot's Operating Handbook to include a note on tail tipping and proper passenger and cargo loading procedures and a warning regarding the hazards associated with overloading or misloading the airplane and the potential for elevator control interference as a consequence of a tail bumper ground strike. The amendment should advise pilots that damage to the empennage should be examined by a qualified aircraft mechanic and repaired, if necessary, before further flight. (Class II, Priority Action) (A-94-93)

Issue an Air Carrier Operators Bulletin to require that Principal Operations Inspectors review the training curriculums of the Part 135 Certificate Holders of Cessna 400 series airplanes and ensure that the curricula include proper passenger and cargo loading procedures and adequately address the hazards associated with overloading or misloading the airplane and the potential for elevator control interference as a consequence of a tail bumper ground strike. The curricula should advise pilots to have damage to the empennage examined by a qualified aircraft mechanic and repaired, if necessary, before further flight. (Class II, Priority Action) (A-94-94)

Issue an airworthiness directive requiring the modification of Cessna 400 series airplane tail bumpers to ensure that damage from a tail bumper ground strike will not cause elevator control interference. (Class II, Priority Action) (A-94-95)

Also as a result of its investigation, the Safety Board issued Safety Recommendations A-94-96 and -97 to the Cessna Aircraft Company.

Chairman VOGT, Vice Chairman COUGHLIN, and Members LAUBER, HAMMERSCHMIDT, and HALL concurred in these recommendations.

A handwritten signature in black ink, appearing to read 'W. Vogt', written in a cursive style.

By: Carl W. Vogt  
Chairman