

NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON, D.C.

ISSUED: April 16, 1981

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Forwarded to:

Mr. Charles E. Weithoner  
Acting Administrator  
Federal Aviation Administration  
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-81-44 and -45

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The National Transportation Safety Board's investigation of the crash of a Bellanca 8 KCAB Decathlon aircraft in Queenstown, Maryland, on March 7, 1979, has revealed a hazardous condition which could affect the safety of flight of similarly equipped aircraft when performing aerobatic maneuvers. The pilot of the accident aircraft was practicing for his flight demonstration to obtain an "unlimited letter of competence" permitting aerobatics at and above ground level (AGL) when the aircraft crashed. He already held a "letter of competence" permitting him to perform aerobatics at and above an altitude of 200 feet AGL.

The investigation failed to disclose an aircraft mechanical malfunction, and postmortem examination of the pilot revealed no preexisting diseases. However, the aircraft's previous owner stated that during full forward stick aerobatic maneuvers the rear control stick had become entangled on occasion in the front-seat acrobatic shoulder harness where it was routed up the back of the front seat. He said that freeing the control stick was accomplished by releasing the front-seat narrow webbing lapbelt, thus releasing the shoulder harness. Additionally, a student of the fatally injured pilot said that earlier in the week the front-seat narrow webbing lapbelt had been slipping and had to be retightened between maneuvers.

The front seat of the accident aircraft, which was manufactured in 1972, was equipped with a dual-restraint system designed to provide restraint for normal and aerobatic flight. The front-seat restraint system consisted of a lapbelt of narrow webbing with a fabric-to-metal friction buckle. The lapbelt was attached to the seatframe at the seatback-to-seatpan intersection. The seat also was equipped with a narrow webbing, dual-strap shoulder harness which slipped over the lapbelt webbing. Each shoulder harness strap was modified from the original installation to attach to the seatframe at the same points as the lapbelt. The shoulder harness was routed up the back of the seat and through fabric shoulder harness guides at the top of the seatback. An additional lapbelt of wider webbing, equipped with a metal-to-metal buckle, was attached to the floor. Bellanca has indicated that the restraint systems described above were standard equipment for that model year. However, the shoulder harness straps were designed to attach at a single point to the overhead wing carry-through

structure rather than to the seat where they must be routed up the back of the seat. Later models of the Decathlon employ a lapbelt and single diagonal shoulder harness as the primary restraint system and a five-point acrobatic restraint system with the shoulder harness installed in front of the seatback and the inertia reel attached to the seatpan frame.

Thus, a potentially dangerous situation is created when the attach points of the acrobatic shoulder harness are altered on aircraft manufactured prior to 1973, such as was done in the accident aircraft, and/or when the shoulder harness straps are routed behind the front seatback. In fact, the propensity for owners to reroute the shoulder straps creating this hazard to acrobatic flight apparently was recognized by the Bellanca Aircraft Company. In May 1977, the company changed the FAA-approved Decathlon flight manual by adding a new section, "Occupant Restraint Systems," which contains the following caution: "DO NOT ALLOW SHOULDER HARNESS TO RUN UP BEHIND THE FRONT SEAT BACK WHERE IT MAY POSSIBLY INTERFERE WITH REAR STICK MOVEMENT." This section also notes that the acrobatic restraint system does not provide crash protection and therefore should always be used with the primary lapbelt and shoulder harness. This information should be particularly useful to owners of Decathlon aircraft built between 1973 and 1977 who presently may be unaware of the potential hazard.

The Safety Board believes that a modified acrobatic restraint system which permits the acrobatic shoulder harness straps to run up the back of the front seat as described above presents a potential hazard in acrobatic flight since this modification apparently can result in entanglement of the rear control stick with the front-seat shoulder harness.

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

Immediately issue a General Aviation Airworthiness Alert warning Decathlon owners of the potential hazards to acrobatic flight when they modify Decathlon acrobatic restraint systems by attaching the shoulder harness to the seatpan frame and/or route the shoulder straps behind the seatback. (Class I, Urgent Action) (A-81-44)

Issue an Airworthiness Directive revising the Bellanca Decathlon FAA-approved flight manual for aircraft manufactured prior to 1977 to include the relevant cautionary information of section 2.1.9, "Occupant Restraint Systems," which is contained in subsequent approved flight manuals. An accurate description of the proper installation of the restraint systems should be included. (Class II, Priority Action) (A-81-45)

KING, Chairman, DRIVER, Vice Chairman, McADAMS, GOLDMAN, and BURSLEY, Members, concurred in these recommendations.

By: James B. King  
Chairman

