Log 1025

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: March 12, 1979

Forwarded to:
Honorable Langhorne M. Bond
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)
A-79-7 and 8

On August 30, 1978, a Piper Model 31-350 aircraft, N44LV, crashed shortly after takeoff from Las Vegas, Nevada; the 10 persons on board were killed. Witnesses saw the aircraft reach a steep nose-high attitude after takeoff before it fell off on the right wing, reversed direction, and dove toward the ground. The aircraft had achieved a nearly flat attitude in an apparent attempt to recover when it struck the ground with high vertical forces.

An inspection of the aircraft's flight control system disclosed that an elevator surface control stop bolt had become loosened and was extended to a position where it restricted the travel of the elevator surface in the trailing-edge-down direction. The control stop consists of a bolt threaded into the aluminum casting which contains the elevator hinge bearing. The stop is effected as the elevator torque arm assembly bottoms against the head of this bolt. The up-stop bolt and the down-stop bolts are adjusted during installation or subsequent rigging of the control system to provide the specified rotational range of elevator travel. The bolts are then locked into place by applying torque to a jam nut against the hinge bearing housing assembly. The postaccident examination disclosed that the down-stop bolt was extended about 1/2 inch from its "as installed" position before it sustained impact damage. This extension would have restricted the elevator travel to less than half of its normal range. The trailing-edge-down travel would have been 1° to 2° below the neutral or faired position.

Flight tests conducted after the accident showed that an aircraft with the same load and center of gravity location as N44LV would pitch up at an increasing rate after takeoff if the elevator was held in a neutral position. Trailing edge down elevator was required to recover from this maneuver.

AAR-79-8

Two other instances of elevator control stops which were not in their proper position were discovered during a fleet inspection by the Las Vegas Airlines after the accident. Another instance of a control stop loosening during flight was reported to the FAA by an Oklahoma operator of a PA-31-350.

The PA-31-350 was certificated under Part 3 of the Civil Air Regulations. Paragraph 3.340 specifies that control stops must be located so that slack, wear, or takeup adjustment will not affect the range of surface travel. The possibility that an extension of the PA-31's surface control stops could result from improper torque of the jam nut or application of vibratory loads is not covered by the regulation.

Current requirements for certification of new aircraft, as specified in Part 23 of the Federal Aviation Regulations, are essentially the same as those of CAR 3 with regard to control stops. However, paragraph 23.607, which concerns the use of self-locking nuts, might be considered applicable to control stops. This paragraph specifies the use of a nonfriction locking device on any bolt which is subject to rotation in operation. This would imply that the elevator control stop bolts on the PA-31 aircraft would have to be locked in position by some positive means other than a jam nut. The Safety Board is aware that the stops on other control surfaces on the PA-31 aircraft and the stops on control surfaces of other model Piper aircraft are of similar design.

Since the potential is great for a catastrophic accident, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Issue an Airworthiness Directive to require the immediate inspection of all Piper aircraft equipped with control stop bolt installations where extension of the stop bolt can limit control surface travel to determine if stop bolt position or jam nut torque has changed. Require readjustment of the stop bolt and retorquing of the jam nut as necessary. Require that the stop bolt installation be modified to include safety wire or some other positive nonfriction means of preventing rotation of the stop bolt during the application of vibratory loads. (Class I--Urgent Action) (A-79-7)
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> Issue a Maintenance Bulletin to alert general aviation inspectors of the possibility of loosened or misadjusted control stop bolts on general aviation aircraft. Stops on various

models of aircraft should be spot checked to ensure that control stop bolts are positively secured and that there is no possibility that vibratory loads can result in a change in the range of travel of any control surface. (Class I--Urgent Action) (A-79-8)

KING, Chairman, DRIVER, Vice Chairman, McADAMS and HOGUE, Members, concurred in the above recommendations.

By: James B. King
Chairman