Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

200 Promenade du Portage
Place du Centre - 4th Floor
Gatineau, Quebec
K1A 1K8

Our file Reference

A12W0090-D2-L1

02 November 2012

Mr Doug Sowder, President
International Aerobatic Club
EAA Aviation Center
P.O. Box 3086
Oshkosh, Wisconsin
54903-3086

Subject : AVIATION SAFETY INFORMATION A12W0090-D2-L1
Overtravel of Elevator Flight Control System in Pitts S-1S Aircraft

Dear Mr. Sowder,

On 12 July 2012, a single-seat, privately operated amateur-built Pitts Special S-1S biplane, registration C-FCHY, departed the Rocky Mountain House Aerodrome, Alberta, at approximately 1615 Mountain Daylight Time, on a local aerobatic training flight. About 15 minutes into the flight the aircraft entered a conventional upright spin at approximately 3000 feet above ground, rotated about 1 1/4 turns and then entered an inverted spin. The aircraft remained in the inverted spin for 10 to 12 rotations and stopped rotating in close proximity to the ground. After the inverted spin rotation stopped the aircraft continued to descend with little or no forward speed and struck the ground in an inverted 60 to 70 degree nose-down attitude. The aircraft sustained substantial damage and the pilot sustained fatal injuries.

In accordance with the Transportation Safety Board of Canada (TSB) Occurrence Classification Policy, the circumstances of this occurrence were assessed, and the occurrence was classified as a Class 5 occurrence. Consequently, TSB activity was limited to the collection of data, which has been recorded for safety analysis, statistical reporting, and archival purposes. The following paragraphs contain safety-related information derived during the assessment of this occurrence.

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The elevator control system on a Pitts S-1S is a conventional push-rod system. Elevator travel limits are set by adjusting two elevator stop bolts that thread into nuts welded on the shroud on the elevator torque tube assembly, near the base of the flight control stick (See Photo 1).

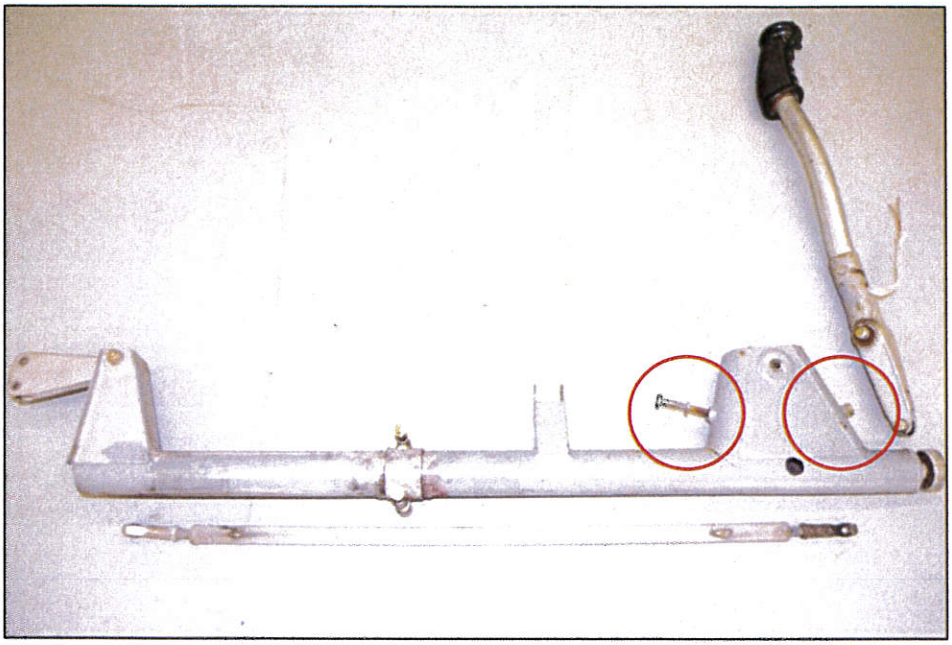

Photo 1. Pitts S-1S elevator control stick, torque tube, elevator stop bolts and forward elevator push-rod

During wreckage examination it was identified that the down elevator stop bolt, which limited forward control stick and down elevator travel, had backed out about 11/16 inches. The lock nut was not securing the stop bolt and the head of the bolt had been rubbing on the forward face of the cockpit fire extinguisher bracket for some time (See Photo 2).

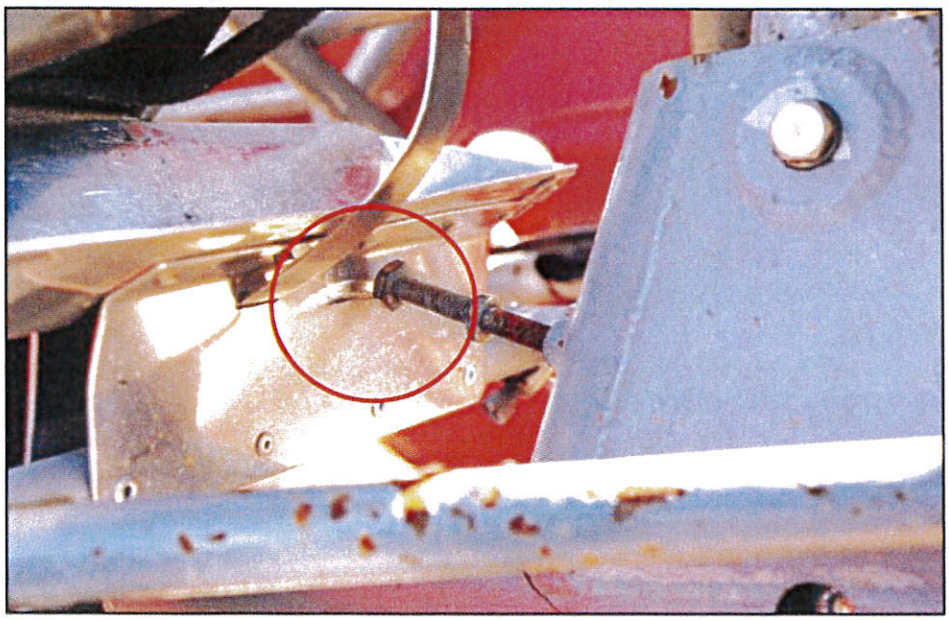

Photo 2. Elevator stop bolt contacting fire extinguisher bracket

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The elevator stop bolt had backed out far enough that it was no longer contacting the lower end of the flight control stick at the limit of travel; instead the flight control stick was contacting the inner wall of the torque tube assembly with the control stick in the full forward position. While not considered a factor in the accident, the tube wall on the forward elevator push-rod assembly, part number 510-058, was worn at both ends, due to overtravel of the push-rod assembly within the torque tube (See Photos 3 and 4).

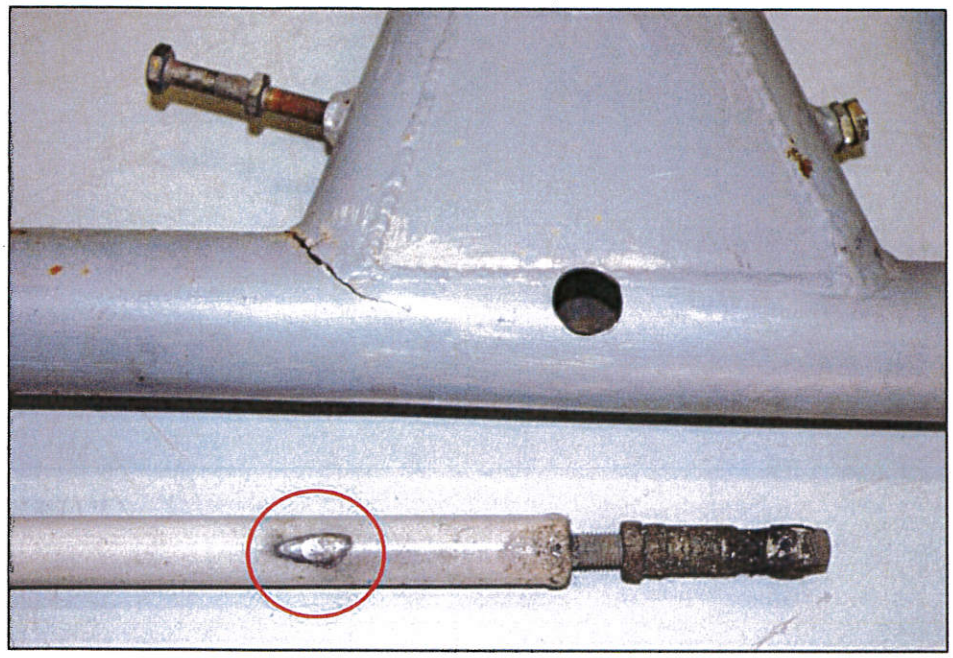

Photo 3. Wear on forward elevator push-rod (note: crack in torque tube impact related)

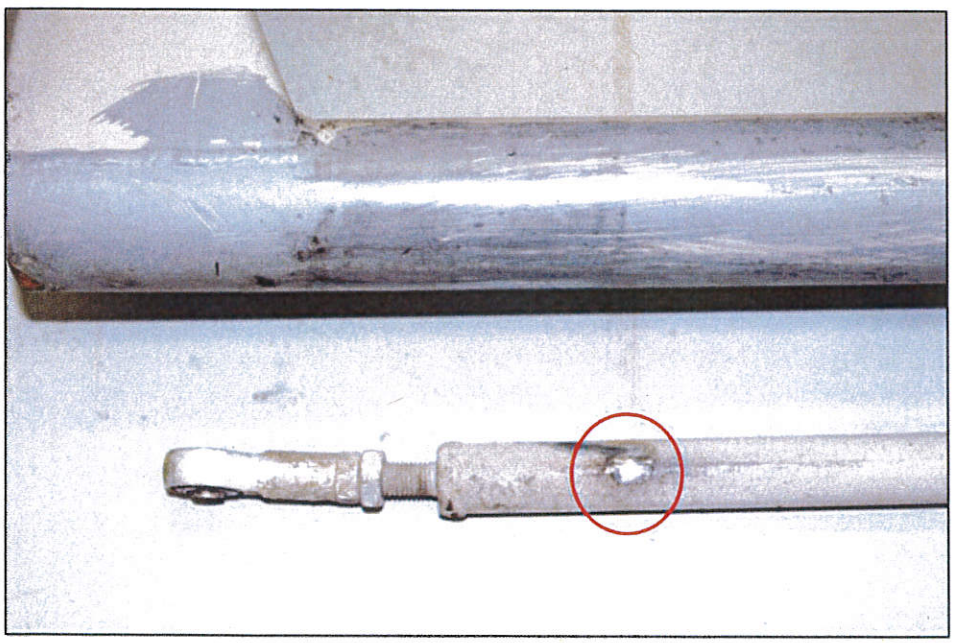

Photo 4. Wear on aft end of forward elevator push-rod

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The wear was not visible without removing the forward elevator push-rod assembly from the torque tube. Pre-occurrence rigging of the elevator flight control system could not be determined due to the extent of impact damage; however, it is probable that the backing out of the down elevator stop bolt would have resulted in overtravel of down elevator.

Overtravel of the elevator flight control system on a Pitts S-1S due to incorrect adjustment of or backing off of the elevator stop bolts may result in interference between the elevator torque tube and the forward elevator push-rod, as evidenced by localized wear on the outer surface of the elevator push-rod. This condition increases the risk of failure of the elevator flight control system, which could contribute to an inflight loss of control.

This information is provided for whatever action you deem appropriate.

Yours sincerely,

Mark Clitsome
Director of Air Investigations
Transportation Safety Board of Canada

cc: Mr. Martin Eley
Director General, Civil Aviation
Transport Canada
330 Sparks Street, Place de Ville
Tower C, 5th Floor, Area A
Ottawa, Ontario
K1A 1K8

Mr. Stuart Horn
President, Aviat Aircraft Inc.
672 S. Washington Street
P.O. Box 1240
Afton, Wyoming, USA
83110

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BACKGROUND INFORMATION

Occurrence No. :	A12W0090
This Safety Communication No. :	A12W0090-D2-L1
TSB Contact :	Bill Kemp (IIC) Phone: (780) 495-2003 Email: bill.kemp@tsb-bst.gc.ca