Aviation Investigation Final Report

Location:	Fullerton, California	**Accident Number:**	WPR23LA317
Date & Time:	August 8, 2023, 15:00 Local	**Registration:**	N503JA
Aircraft:	Piper PA-24-260	**Aircraft Damage:**	Substantial
Defining Event:	Flight control sys malf/fail	**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Shortly after takeoff the airplane began to shake violently with the control yoke moving rapidly forward and aft from stop to stop. The pilot was able to perform an on-airport emergency landing after shutting down the engine, but sustained hand injuries due to the extreme control forces and oscillations.

The airplane sustained substantial damage to the stabilator structure in a manner consistent with it exhibiting aerodynamic flutter. Postaccident examination revealed that the stabilator tab actuator was disconnected from the control tab, and the bolt, nut, and washer that connected them were missing. The disconnection of the actuator allowed the tab surface to uncouple, which resulted in flutter and structural damage to the stabilator.

Circumferential scoring around the bolt hole within the tabs indicated that the bolt was likely loose for an undetermined period before failure. The nut had likely not been replaced since the airplane was manufactured almost 60 years before the accident, so its locking properties would have been significantly diminished.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The separation of the stabilator actuator from the stabilator tab, which resulted in pitch control surface flutter and structural damage.

Findings

Aircraft	Elevator tab control system - Fatigue/wear/corrosion
Aircraft	Elevator tab control system - Damaged/degraded
Aircraft	Elevator tab control system - Failure

Factual Information

History of Flight

Enroute-cruise	Flight control sys malf/fail (Defining event)
Enroute-cruise	Aircraft structural failure

On August 8, 2023, about 1500 Pacific daylight time, a Piper PA-24-260, N503JA, was substantially damaged when it was involved in an accident near Fullerton, California. The pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that, shortly after takeoff, the airplane began to shake violently with the control yoke moving rapidly forward and aft from stop to stop. The vibrations were so extreme that he assumed the engine had suffered a catastrophic failure, such as a detached engine cylinder. He shut down the engine and turned the airplane back to the airport for landing. The pilot stated he was able to land, but sustained hand injuries due to the extreme control forces and oscillations.

The airplane sustained substantial damage to the stabilator structure and postaccident examination revealed that the stabilator tab actuator was disconnected from the control tab, and the bolt, nut, and washer that connected them were missing (figure 1).

Figure 1 - Stabilator tab disconnected from the actuator.

The tabs sustained extensive scratch and peening damage to both their inner and forward surfaces consistent with high frequency oscillations. The paint around the end of the tab actuator arm had chipped away, revealing similar peening damage to its steel surface.

Neither the bolt nor the nut that connected the tabs to the actuator were located, and there was circumferential scoring to the tabs around the bolt hole bore. Neither bolt hole appeared to be elongated. Likewise, the bushing within the actuator did not appear to be out of round.

According to the airplane's illustrated parts catalog, the actuator retaining nut was supposed to be a self-locking type, with no provisions for a cotter pin. The mechanic who had performed an annual inspection 5.5 flight hours before the accident stated that he did not remove or replace either the bolt or the nut, and that he performed a functional check of the pitch trim system with no anomalies noted.

Examination of the maintenance logbooks did not reveal any evidence that the nut had been replaced since the airplane was manufactured in 1965.

Pilot Information

Certificate:	Flight instructor	**Age:**	41,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine; Instrument airplane	**Toxicology Performed:**	
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	June 23, 2023
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	April 14, 2022
Flight Time:	2441.6 hours (Total, all aircraft), 125 hours (Total, this make and model), 2351.8 hours (Pilot In Command, all aircraft), 190 hours (Last 90 days, all aircraft), 40 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N503JA
Model/Series:	PA-24-260	**Aircraft Category:**	Airplane
Year of Manufacture:	1965	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-4165
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	July 1, 2023 Annual	**Certified Max Gross Wt.:**	2900 lbs
Time Since Last Inspection:	5.5 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3849.7 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-540-D4A5
Registered Owner:	On file	**Rated Power:**	260 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KFUL,86 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	15:53 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.96 inches Hg	**Temperature/Dew Point:**	29°C / 17°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fullerton, CA (FUL)	**Type of Flight Plan Filed:**	None
Destination:	La Verne, CA (POC)	**Type of Clearance:**	None
Departure Time:	14:45 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	FULLERTON MUNI FUL	**Runway Surface Type:**	Asphalt
Airport Elevation:	96 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	24	**IFR Approach:**	None
Runway Length/Width:	3121 ft / 75 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	33.872014,-117.97978(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Craig Schneider; Federal Aviation Administration FSDO; Long Beach, CA
Original Publish Date:	June 20, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=192891