Aviation Investigation Final Report

Location:	FORT LAUDERDALE, Florida	**Accident Number:**	MIA99LA242
Date & Time:	September 1, 1999, 09:30 Local	**Registration:**	N52PB
Aircraft:	Sukhoi SU-29	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot been doing aerobatic snap rolls. After approximately 10-15 snaps he began another. As he pulled on the stick he '...felt the ailerons brake loose.' He recovered from the snap at 2,500 feet agl. The airplane started a 20 degree to 30 degree steep descending turn to the right. He attempted to right the airplane with back stick and left rudder to no avail. He elected to make a controlled landing in a turn. About 600 feet agl the right wing went down to 90 degrees the nose then went down the same till impact with the ground. At no time did he have any directional or aileron control of the airplane. Laboratory examination of the inboard sections of the right aileron, the inboard aerodynamic compensator (spade) from the right aileron, and the outboard aerodynamic compensator from the left aileron, revealed, the in-flight loss of control was due to fatigue cracking and the subsequent fracture of the actuator lever attaching the right aileron to the control rod. In addition, the left aileron was cracked and a portion of this spar had been missing for some time. The fatigue cracking in the actuator lever from the right aileron and the rupture of the aft spar in the left aileron were precipitated by the fatigue cracking in the attachment structure of the inboard spade from the right aileron and the outboard spade from the left aileron.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: an in-flight failure of the right aileron due to fatigue cracking in the attachment structure of the right inboard aerodynamic compensator, which resulted in a loss of control, a forced landing, and subsequent impact with the ground.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING

Findings
1. (C) FLIGHT CONTROL,AILERON - FAILURE

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - EMERGENCY

Findings
2. TERRAIN CONDITION - GROUND

Factual Information

On September 1, 1999, about 0930 eastern daylight time, a Sukhoi SU-29, N52PB, registered to Aerial Three Inc., impacted with the ground near unincorporated Fort Lauderdale, Florida. Visual meteorological conditions prevailed at the time, and no flight plan was filed for the 14 CFR Part 91 local personal flight. The airplane was destroyed. The commercial-rated pilot reported serious injuries. The flight had departed from the North Perry Airport, Hollywood, Florida, about 0900.

According to a witness, that was riding a lawn mower near the crash site, he saw the airplane at a low altitude, about 150-200 feet above the ground, heading in an easterly direction. The airplane turned 360 degrees to the right, descended, leveled off, for short time, then entered a steep nose low turn to the right, until it impacted the ground. In addition, the witness said the airplane was moving slow, after it had leveled off, and before it went into the nose low steep turn. The witness could not hear the sound of the airplane's engine because his lawn mower was running, and the noise of the lawn mower was too loud to hear anything.

The pilot stated, "...began doing aerobatic snap rolls. After approximately 10-15 snaps I began another. As I pulled on the stick I felt the ailerons brake loose. I recovered from the snap at 2,500 [feet] agl. The airplane started a 20 degree to 30 degree steep descending turn to the right. I tried to right the airplane with back stick and left rudder to no avail. At about 1,500 [feet] agl I decided I would make a controlled landing in a turn. At about 600 [feet] agl the right wing went down to 90 degrees the nose then went down the same till impact with the ground. At no time did I have any directional or aileron control of the airplane."

Examination of the wreckage revealed that the inboard aerodynamic compensator from the right aileron had failed. Examination of the airplane's records revealed that at the time of the accident that the ailerons were manufactured June of 1992, total time accumulated on the airframe was 331.6 hours, and 23 hours since the last airframe inspection.

The following components were removed from the airplane and examined at the NTSB Materials Laboratory, Washington, D.C. on October 20 to 22, 1999. The componets that were examined were; the inboard sections of the right aileron, and the inboard aerodynamic compensator (spade) from the right aileron, the outboard aerodynamic compensator from the left aileron.

The NTSB Materials Laboratory examination of the parts revealed fatigue cracking and a subsequent fracture of the actuator lever attaching the right aileron to the control rod. The examination further revealed that the aft spar in the left aileron was cracked and a portion of this spar had been missing for some time. The fatigue cracking in the actuator lever from the right aileron and the rupture of the aft spar in the left aileron were precipitated by the fatigue

cracking in the attachment structure of the inboard spade from the right aileron and the outboard spade from the left aileron.

The examination revealed that all of the aileron's spades contained shims (washers) between the spacer and the attachment plate for the forward holes. The presence of the shims at the forward end of the spade attachment increased the aileron rational moment and, therefore, induced additional stresses to the spade attachment structures. According to the airplane's manufacturer a reinforcement kit had been manufactured for the spade attachment area. This kit had not been applied to the accident airplane. According to the manufactures records the reinforcement kit for the spades attachments were made available to the USA distributor of SU-29 airplanes before the accident, and before the owner of the airplane at the time of the accident had purchased the airplane from the previous owner. The previous owner of the airplane was also the USA distributor for the SU-29, when the reinforcement kits were made available. The airplane's records did show any entry indicating that the kits were installed.

According to the airplane's manufacturer the damage and fractures observed in the ailerons from the accident airplane were typically found in the ailerons that had exceeded the service life. It was revealed that the total time on the ailerons was not computed by the pilot in accordance to the formula that had been recommended by the manufacturer. The formula takes into account that the ailerons are subject to additional stress because the airplane is aerobic certified. In this case because the incorrect method of calculating total time, the reported total time on the ailerons (331.6 hours) was well below the total time calculated using the manufacturer's recommended formula. (See the NTSB Materials Laboratory Factual Report, an attachment to this report.)

Pilot Information

Certificate:	Commercial	**Age:**	31,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Rear
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	June 3, 1998
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	7000 hours (Total, all aircraft), 200 hours (Total, this make and model), 150 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Sukhoi	**Registration:**	N52PB
Model/Series:	SU-29 SU-29	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	72-03
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	March 24, 1999 Continuous airworthiness	**Certified Max Gross Wt.:**	2000 lbs
Time Since Last Inspection:	23 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	332 Hrs	**Engine Manufacturer:**	Vendeneyev
ELT:	Not installed	**Engine Model/Series:**	M-14P
Registered Owner:	AERIAL THREE INC.	**Rated Power:**	360 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	FXE ,14 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	09:53 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Scattered / 25000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	29°C / 24°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HOLLYWOOD , FL (HWO)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	09:00 Local	**Type of Airspace:**	Class D

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	26.010461,-80.460121(est)

Administrative Information

Investigator In Charge (IIC):	Yurman, Alan
Additional Participating Persons:	STEVE GORDON; FORT LAUDERDALE, FL
Original Publish Date:	December 4, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=47238