



National Transportation Safety Board Aviation Accident Final Report

Location:	Arlington, AZ	Accident Number:	WPR17FA134
Date & Time:	06/27/2017, 0849 MST	Registration:	N731RV
Aircraft:	JORDAN JOHN RV7	Aircraft Damage:	Destroyed
Defining Event:	Birdstrike	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The airline transport pilot and private pilot-rated passenger were in cruise flight when radar contact was lost. Wreckage and impact signatures revealed that the airplane impacted the ground in an inverted, left-wing-down, nose-down attitude. The cockpit canopy, vertical stabilizer, and rudder were found about 1 mile from the main wreckage. Examination of the engine found no abnormalities that would have precluded normal operation.

Examination of the airframe revealed biological matter in a dented section underneath the horizontal stabilizer, as well as bird feathers in the cockpit under the passenger seat. DNA and microscopic examination of the specimens were consistent with a rock pigeon. All fracture surfaces examined were consistent with overstress failure; there were no indications of any preexisting damage such as cracks or corrosion. The fracture surfaces of the spars, skins, stabilizers, and other components from the horizontal stabilizer, vertical stabilizer, and rudder assemblies exhibited features consistent with secondary fractures (such as from ground impact or after the bird strike). There were no clear indications that any of the components that fractured in overstress did so prior to ground impact or independently of the bird strike. It is possible that the pilot made an evasive maneuver before or during impact with the bird, that in combination, resulted in an overstress structural failure of the, vertical stabilizer and rudder, which in turn resulted in the pilot's inability to maintain control of the airplane.

Probable Cause and Findings

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

The inflight overstress separation of the vertical stabilizer and rudder during flight which resulted in the pilot's inability to maintain airplane control. Contributing to the accident was an inflight collision with a bird.

Findings

Aircraft	Vertical stabilizer - Failure (Cause) Rudder - Failure (Cause) Performance/control parameters - Attain/maintain not possible (Cause)
Environmental issues	Animal(s)/bird(s) - Effect on equipment (Factor)

Factual Information

****This report was modified on December 4, 2018. Please see the docket for this accident to view the original report.****

HISTORY OF FLIGHT

On June 27, 2017, about 0849 mountain standard time, a Vans RV-7, N731RV, was destroyed when it impacted terrain about 10 miles southwest of Arlington, Arizona. The airline transport pilot and the pilot-rated passenger sustained fatal injuries. The airplane was owned and operated by the pilot under the provisions of Title 14 *Code of Federal Regulations* Part 91. Visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed for the local personal flight, which originated from Buckeye Municipal Airport (B XK), Buckeye, Arizona, about 0835.

After family members of the pilot became concerned when he did not arrive at his intended destination, the Federal Aviation Administration (FAA) issued an alert notice (ALNOT) for the airplane. The wreckage was found by local law enforcement in the Gila Mountains at 1810.

Review of radar data revealed a primary target correlated with the accident airplane about 2.5 miles southeast of B XK at 2,200 ft mean sea level (msl), heading southwest and climbing. At 0844, at 3,349 ft msl, the target turned west and continued to climb. About a minute later, the target had climbed to about 6,700 ft msl and completed a 360° right turn. The target then continued southwest, and at 0847, made a left 180° turn to the northeast at 7,600 ft msl. The target continued along this heading before radar returns were lost at 0849; the last return was near the accident site.

PERSONNEL INFORMATION

The pilot, age 78, held an airline transport pilot certificate with ratings for airplane single- and multi-engine land and single-engine sea. The pilot was issued a third-class FAA medical certificate on March 29, 2016, with a limitation that he must wear corrective lenses. On the application for that medical certificate, the pilot reported 22,510 total hours of flight experience, of which 10 hours were in the previous six months. The pilot also held a flight instructor certificate for multi-engine airplane, flight engineer certificate for turbojet-powered and reciprocating-engine-powered airplanes, and a mechanic certificate with airframe and powerplant ratings.

The passenger held a private pilot certificate with a rating for airplane single-engine land. He was issued a FAA third-class airman medical certificate on August 14, 2015, without limitations. On the application for that medical certificate, he reported flight experience that included 3.2 hours total and 3.2 hours in previous six months.

AIRCRAFT INFORMATION

The RV-7 is a two-place, tandem-seat, low-wing amateur-built airplane with conventional landing gear powered by a 200-hp Lycoming O-320-A1A engine. The airplane was issued an

FAA airworthiness certificate on November 4, 2013. The airplane maintenance records were not located during the investigation, and the airplane's maintenance history could not be determined.

METEOROLOGICAL INFORMATION

At 0853, the automated weather observation for BXX, located about 18 miles northeast of the accident site, reported wind from 140° at 10 knots, visibility 10 statute miles with no clouds, temperature 33°C, dew point 4°C, and an altimeter setting of 29.85 inches of mercury.

WRECKAGE AND IMPACT INFORMATION

The airplane impacted rocky, desert terrain and was destroyed by impact forces. The wreckage was dispersed in a triangular pattern over an area that contained two north/south oriented gullies and exhibited impact damage consistent with an inverted, left-wing-down, nose-down attitude at the time of impact. The debris field was 264 ft long and 270 ft wide. The wreckage debris path was oriented on a magnetic heading about 77° from the first identified point of contact (FIPC) to the main wreckage. The FIPC was an area of disturbed ground about 10 inches wide and about 10 ft long that contained red lens fragments. At the end of the area of disturbed ground was the impact crater, measuring about 4 ft in diameter, containing the propeller assembly and engine. One of the propeller blades exhibited heavy gouging on the leading edge and chordwise scoring. The other blade displayed forward bending at the midsection, leading edge scoring and missing material at the tip. The main wreckage was found 146 ft from the FIPC and in the bottom of a 10-ft-deep gully. The main wreckage comprised the horizontal stabilizers and both elevators, cabin area structure, and both wings. The horizontal stabilizer and associated structure remained attached to the main wreckage by the rudder flight control cables and electrical wires. Flight control continuity was attained to the forward cabin area through control cables and impact-damaged push-pull tubes. The left aileron remained attached to the wing by its inboard attachment point. The right aileron separated from the wing and was found near the main wreckage. Both flaps remained attached to the wing and were in a position consistent with the retracted position at the time of impact. The right flap separated at its outboard attachment point and was bent upwards at its midsection. The leading edges of both wings separated, revealing the aft side surfaces of the fuel tanks. The leading edges of both wings displayed crush damage from the tip to the root. Both wing tips separated, and the attachment structure had impact damage. The right wing outboard section was bent downward. The forward side of the cabin floor area exhibited crush damage. The plexiglass canopy, vertical stabilizer, and rudder were not located during the examination of the accident site on that day; they were located several days later about 1 mile northwest of the main wreckage.

During the examination of the recovered wreckage, specimens of biological matter were observed on the underside of the right horizontal stabilizer. Bird feathers were found in the cockpit under the passenger seat. The specimens were collected and sent for further identification and classification. Several components from the empennage, including the vertical stabilizer and horizontal stabilizer assemblies, were shipped to the NTSB materials lab for further examination. Examination of the airframe, engine, and system components revealed no evidence of preimpact mechanical malfunction that would have precluded normal operation.

The complete accident site, engine, and airframe examination reports are appended to this accident in the public docket.

MEDICAL AND PATHOLOGICAL INFORMATION

The Office of the Medical Examiner at Maricopa County, Phoenix, Arizona, completed an autopsy on the pilot and the passenger and concluded that the causes of death were multiple blunt force trauma and thermal injuries.

The FAA's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens from the pilot. The specimen used to test for volatiles tested positive for ethanol in muscle and lung, N-butanol and propanol in muscle. The test did not detect a presence of drugs in lung. Tests for carbon monoxide and cyanide were not performed.

The Federal Aviation Administration's Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma, performed toxicology testing on specimens from the passenger. The specimen used to test for volatiles tested positive for ethanol and propanol in muscle. The test did not detect a presence of drugs in muscle. Tests for carbon monoxide and cyanide were not performed.

TEST AND RESEARCH

The Feather Identification Lab, Smithsonian Institution, Washington, DC, determined that biological matter in specimens sent to the lab contained five whole feathers and some downy feather material. All the whole feathers matched a single museum specimen of rock pigeon. Additionally, microscopic examination of the feather samples was consistent with rock pigeon.

On March 23, 2018, airframe components from the empennage were examined at the NTSB Materials Lab, in Washington, DC, and additional samples of biological matter were collected. These samples were extracted from a dented section underneath the horizontal stabilizer to the right of the tailcone, including a small whole feather that was found deep inside the bottom right side of the empennage. This feather and the additional empennage samples were also identified as rock pigeon based on whole feather comparisons and microscopic analysis. Additionally, the impact dent was consistent with the typical size of this bird species.

Components from the empennage, the vertical stabilizer and horizontal stabilizer assemblies were examined to determine the nature of fractured surfaces. All the fracture surfaces were consistent with overstress, and there were no indications of any preexisting damage such as cracks or corrosion. All the examined fracture surfaces of the spars, skins, stabilizers, and other components from the horizontal stabilizer, vertical stabilizer, and rudder assemblies exhibited features consistent with secondary fractures (such as ground impact). There were no clear indications that any of the components that fractured in overstress did so before ground impact or independently of the bird strike.

The complete Smithsonian Feather Lab report and NTSB Materials Lab report are appended to this accident in the public docket.

History of Flight

Enroute-cruise	Birdstrike (Defining event) Part(s) separation from AC Loss of control in flight
----------------	--

Pilot Information

Certificate:	Airline Transport; Flight Engineer	Age:	78
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Unknown
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	
Instructor Rating(s):	Airplane Multi-engine	Toxicology Performed:	Yes
Medical Certification:	Class 3 With Waivers/Limitations	Last FAA Medical Exam:	03/29/2016
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 22510 hours (Total, all aircraft)		

Pilot-Rated Passenger Information

Certificate:	Private	Age:	41, Male
Airplane Rating(s):	Single-engine Land	Seat Occupied:	Unknown
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	None	Second Pilot Present:	
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 None	Last FAA Medical Exam:	08/14/2015
Occupational Pilot:	No	Last Flight Review or Equivalent:	
Flight Time:	(Estimated) 3.2 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	JORDAN JOHN	Registration:	N731RV
Model/Series:	RV7 UNDESIGNAT	Aircraft Category:	Airplane
Year of Manufacture:	2004	Amateur Built:	Yes
Airworthiness Certificate:	Experimental	Serial Number:	70083
Landing Gear Type:	Tailwheel	Seats:	2
Date/Type of Last Inspection:	Unknown	Certified Max Gross Wt.:	
Time Since Last Inspection:		Engines:	Reciprocating
Airframe Total Time:		Engine Manufacturer:	Lycoming
ELT:		Engine Model/Series:	O-360-A1A
Registered Owner:	On file	Rated Power:	
Operator:	On file	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KBXK, 1021 ft msl	Distance from Accident Site:	16 Nautical Miles
Observation Time:	0815 MST	Direction from Accident Site:	44°
Lowest Cloud Condition:	Clear	Visibility	10 Miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	4 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	140°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.85 inches Hg	Temperature/Dew Point:	33° C / 4° C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	BUCKEYE, AZ (BXK)	Type of Flight Plan Filed:	None
Destination:	BUCKEYE, AZ (BXK)	Type of Clearance:	None
Departure Time:	0835 MST	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	2 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	33.229444, -112.900000 (est)

Administrative Information

Investigator In Charge (IIC): Maja Smith Report Date: 02/26/2019

Additional Participating Persons:

Publish Date: 02/26/2019

Note: The NTSB traveled to the scene of this accident.

Investigation Docket: <http://dms.nts.gov/pubdms/search/dockList.cfm?mKey=95449>

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).