Aviation Investigation Final Report

Location:	Hiram, Georgia	**Accident Number:**	NYC07LA237
Date & Time:	September 19, 2007, 08:45 Local	**Registration:**	N416EC
Aircraft:	ORTIZ G/SAINT J RV-10	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The private pilot of an amateur-built RV-10 performed his preflight inspection, and confirmed that the doors were in the locked position by observing the lock indicator lights on the instrument panel, as well as the lock annunciators on the airplane's electronic flight information system. During cruise flight, at an altitude of 4,500 feet mean sea level, and an estimated cruise speed of 145 knots, he noticed the right door was vibrating. He reached over to grip the door handle and the door began to open upwards. Shortly thereafter the door opened completely, separated from the airframe, and struck the right horizontal stabilizer. The pilot declared an emergency and returned to the departure airport. A search for the separated door was unsuccessful, and postaccident examination of the airplane was inconclusive. As part of the investigation, five RV-10 airplanes fitted with the same door locking mechanism were surveyed. Varying degrees of door lock pin extension lengths were observed between airplanes.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Separation of the passenger cabin door during cruise flight for undetermined reasons.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. DOOR,PASSENGER - SEPARATION
2. REASON FOR OCCURRENCE UNDETERMINED

Occurrence #2: HARD LANDING
Phase of Operation: EMERGENCY LANDING

Factual Information

On September 19, 2007, at 0845 eastern daylight time, an amateur-built RV-10, N416EC, was substantially damaged when the right main cabin door separated from the airframe while in cruise flight near Hiram, Georgia. The certificated private pilot operated the airplane under the provisions of 14 Code of Federal Regulations Part 91. The airplane was substantially damaged, and the pilot was not injured. Visual meteorological conditions prevailed, and no flight plan was filed for the personal flight that departed Cobb County Airport-Mc Collum Field, Atlanta, Georgia, about 0840. The flight was destined for Dothan Regional Airport, Dothan, Alabama.

In a written statement, the pilot described performing his preflight inspection, followed by an engine run-up. He confirmed that the doors were in the locked position by observing the lock indicator lights on the instrument panel, as well as the lock annunciators on the airplane's electronic flight information system. After departure, the pilot leveled the airplane at 4,500 feet mean sea level and engaged the autopilot; he estimated the airplane to be cruising at 145 knots. Five minutes into the flight he noticed the right door was vibrating and he reached across the cabin with his right hand. He gripped the door handle and the door began to open upwards, he was unable to maintain his grip, and shortly thereafter the door opened completely. The door then separated from the airframe.

The pilot initiated a descending right turn back to Cobb County Airport. He informed air traffic control tower personnel that he was declaring an emergency, and in order to minimize control inputs, he elected to configure the airplane for a long final approach to land on runway 9. The airplane's co-owner inspected the airplane after the accident and stated that during the landing sequence, the main wheel pants separated from their mountings, and the airplane sustained damage to the upper fuselage skin, just forward of the windscreen.

Postaccident examination by the pilot revealed that the right horizontal stabilizer had sustained impact damage along its leading edge, consistent with being struck by the departing door. The aft tail cone displayed skin buckling in the area adjacent to the horizontal stabilizer aft deck and bulkhead.

A search for the separated door was unsuccessful.

PERSONNEL INFORMATION

The pilot, age 46, held a private pilot certificate with a rating for airplane single-engine land, issued in January 2005. His most recent Federal Aviation Administration (FAA) third-class medical certificate was also issued in January 2005. He reported a total of 420 hours flight experience, of which 270 hours were in the accident airplane make and model.

AIRCRAFT INFORMATION

The four-seat, low-wing, fixed-gear amateur-built airplane was issued a special airworthiness certificate on October 2, 2006.

The airplane was equipped with two upward opening "gull wing" doors. Each door was affixed to the roof of the cabin with two steel hinge assemblies. The upper cabin and both doors were constructed of composite material. Each door lock assembly consisted of a rack and pinion latch mechanism, and two latch pins set into the lower section of the door panel. The doors were locked by rotating a steel door handle affixed to the pinion gear, and as the gear rotated, the latch pins would extend through a polyethylene pin block and into pin sockets recessed into the forward and aft cabin doorjambs.

According to the airplane's builder and data from the kit manufacturer, the doors were fitted with the latch indicator system supplied with the original airplane kit. This system consisted of four magnetic reed switches located in the proximity of the doorjamb pin sockets. A cylindrical magnet was installed into the end of each latch pin and the location of the reed switches were adjusted such that they would activate when the latch pins extended into the doorjamb. The latch circuit was designed so that the instrument panel indicators would extinguish when the latch pins had reached their locked position.

TEST AND RESEARCH

Post accident examination of the airplane by an FAA safety inspector was inconclusive. Repairs to the airplane were completed before the National Transportation Safety Board investigator-in-charge (IIC) could inspect the damage.

The IIC reviewed photographs of the airplane taken shortly after the accident. The passenger side rear polyethylene doorjamb pin block displayed outward buckling and was observed to be torn on the outside edge adjacent to the pinhole. The passenger side forward block displayed outward buckling.

The IIC conducted a field survey of five RV-10 airplanes fitted with the same door locking mechanism. The latch pin extension lengths, as well as the travel arc of the door lock handles were observed. It was noted that the latch pin extensions varied from 0.90 inches to 1.50 inches between airplanes. The rotational arc of the door handles between the fully locked, and fully open position was observed to be between 90 and 125 degrees. In addition, three of the airplanes displayed outward buckling and cracking of the polyethylene doorjamb pin blocks.

Pilot Information

Certificate:	Private	**Age:**	46,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	January 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 1, 2007
Flight Time:	420 hours (Total, all aircraft), 270 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	ORTIZ G/SAINT J	**Registration:**	N416EC
Model/Series:	RV-10	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	40416
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	July 19, 2007 Condition	**Certified Max Gross Wt.:**	2940 lbs
Time Since Last Inspection:	64 Hrs	**Engines:**	1
Airframe Total Time:	298 Hrs at time of accident	**Engine Manufacturer:**	
ELT:	Installed, not activated	**Engine Model/Series:**	
Registered Owner:	On file	**Rated Power:**	
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:	KRYY,1040 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	08:55 Local	**Direction from Accident Site:**	35°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/ None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.29 inches Hg	**Temperature/Dew Point:**	17°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Atlanta, GA (RYY)	**Type of Flight Plan Filed:**	None
Destination:	Dothan, AL (DHN)	**Type of Clearance:**	None
Departure Time:	08:45 Local	**Type of Airspace:**	Unknown

Airport Information

Airport:	Cobb County Airport RYY	**Runway Surface Type:**	
Airport Elevation:	1040 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	33.870834,-84.726387(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	Charles Stange; FAA/FSDO; Atlanta, GA
Original Publish Date:	November 25, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=66742