Aviation Investigation Final Report

Location:	Rockledge, Florida	**Accident Number:**	MIA08LA023
Date & Time:	December 1, 2007, 12:54 Local	**Registration:**	N79GP
Aircraft:	PORTER GLEN AVENTURA II	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

Following maintenance to the amateur-built airplane, including the manufacture and installation of shoulder harness cables and a condition inspection, the airplane was test flown by the facility general manager on two separate flights lasting a total of one hour. The only discrepancies reported by the general manager related to the airplane's brakes and noise in the headset. While the pilot has no independent recollection of the accident flight, a pilot-rated witness who was outside on the airport reported that his attention was drawn to the accident airplane when he heard a normal sounding engine run-up being performed. He watched the airplane take off, becoming airborne at the midpoint of the runway. The initial takeoff climb appeared normal, then approximately 1.5 seconds later, at an estimated 75 feet above ground level (agl), the left wing dropped or "bobbled." The airplane rolled to the right, then climbed to 100 to 150 feet agl. The right wing raised, the nose pitched up 15 degrees, which was more than a normal pitch attitude, and then the airplane "shuddered" and stalled to the left. The airplane impacted terrain in a left-wing-low attitude. During the impact sequence, the pilot's shoulder harness cable failed prematurely due to improper manufacturing, contributing to his serious head injuries. No evidence of preimpact failure or malfunction was identified for either the flight controls or engine.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the pilot to maintain airspeed during climbout, resulting in an aerodynamic stall and uncontrolled descent. Contributing to the severity of the pilot's injuries was the inadequate manufacture of the shoulder harness restraint cables.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
2. STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
3. TERRAIN CONDITION - GROUND
4. MISC EQPT/FURNISHINGS,SHOULDER HARNESS - FAILURE,TOTAL
5. (F) MATERIAL INADEQUATE,IMPROPER - KIT MANUFACTURER

Factual Information

HISTORY OF FLIGHT

On December 1, 2007, about 1254 eastern standard time, an amateur-built Porter Glen Aventura II, N79GP, registered to and operated by a private individual, experienced an in-flight loss of control and collided with terrain shortly after takeoff from Rockledge Airport (21FA), Rockledge, Florida. Visual meteorological conditions prevailed at the time and no flight plan was filed for the personal local flight conducted under the provisions of 14 Code of Federal Regulations (CFR) Part 91. The airplane was substantially damaged and the commercial-certificated pilot, the sole occupant, sustained serious injuries. The flight was originating at the time of the accident.

The pilot reported that he has no independent recollection of the accident flight. A pilot-rated witness who was outside on the airport reported his attention was drawn to the accident airplane when he heard a normal sounding engine run-up being performed. He watched the airplane takeoff from runway 36, and reported that the airplane became airborne at the midpoint of the runway. The initial takeoff climb appeared normal, then approximately 1.5 seconds later while flying at an estimated 75 feet above ground level (agl), the left wing dropped, or "bobbled." The airplane rolled to the right, then climbed to 100 to 150 feet agl. The right wing raised, the nose pitched up 15 degrees, which was more than a normal pitch attitude, and then the airplane "shuddered," and stalled to the left. At that time he heard the engine rpm increase, which in his 4,000 hours in the accident make of airplane was consistent with cavitation of the propeller. The airplane impacted in a left wing low attitude, and once on-scene, he noted the airplane was inverted, and fuel was leaking from a fuel line at the top of the engine. Further damage was done to the right wing in an effort to rescue the pilot. The witness further stated that the engine sounded "perfect" from the application of takeoff power to the point where the airplane stalled.

The pilot's wife who also witnessed the accident reported that approximately 200 feet agl into the takeoff climb, the left wing dropped and the airplane turned and impacted the ground nose first.

PERSONNEL INFORMATION

The pilot, age 77, holds an airline transport pilot certificate with an airplane multi-engine land rating. He also holds a commercial pilot certificate with airplane single engine land and sea ratings, issued July 24, 1999. He holds a second class medical certificate issued November 6, 2007, with a limitation to wear corrective lenses. In a National Transportation Safety Board Form 6120.1 submitted by the pilot, he annotated that his last flight review in accordance with (IAW) 14 CFR Part 61.56 was on July 25, 2007, and that he possessed 22,000 total flight hours,

with 3 hours in the accident airplane make and model in the previous 90 days.

AIRCRAFT INFORMATION

The amateur-built airplane was manufactured in 2000, as model Aventura II, and was designated serial number AP2A0079. It was powered by a Rotax 582 65-horsepower engine and equipped with a 3-bladed Warp Drive square tip propeller. The exterior of the airplane was marked with "N306TC"; however, Federal Aviation Administration (FAA) records indicate the accident pilot/owner requested a change to "N79GP."

The pilot purchased the airplane in Mississippi on August 10, 2007, and transported it the next day by trailer to the kit manufacturer's factory for extensive work and a condition inspection. The airplane's maintenance records were reportedly left with the facility when the airplane was taken there. At the time the airplane was brought to the facility, the airplane was not equipped with shoulder harnesses; it was only equipped with automotive lapbelts. The lapbelts were replaced and shoulder harnesses were installed during the time the airplane was at the kit manufacturer's facility.

According to the general manager of the facility that worked on the airplane, the maintenance records could not be located; however, he reported the condition inspection was signed off as being completed on either November 29, or the morning of November 30, 2007. After the condition inspection was signed off, the maintenance department released the airplane for a maintenance test flight.

METEOROLOGICAL INFORMATION

A surface observation weather report taken at Patrick Air Force Base (COF), Cocoa Beach, Florida, at 1255, or approximately 1 minute before the accident indicates the wind was from 040 degrees at 9 knots, the visibility was 7 statute miles, broken clouds existed at 2,700 feet. The temperature and dew point were 25 and 21 Celsius respectively, and the altimeter setting was 30.22 inches of mercury. The accident site was located approximately 7 nautical miles and 304 degrees from COF.

AIRPORT INFORMATION

21FA is a private airport with one runway designated 18/36, which is 2,010 feet in length and 45 feet wide.

WRECKAGE AND IMPACT INFORMATION

The airplane crashed in a residential area located approximately .27 nautical mile north-northwest from the approach end of runway 36.

Examination of the accident site by FAA personnel revealed the empennage was nearly vertical

and displaced to the right. The nose and right wing were contacting the ground. A slight amount of fuel leakage was noted; the remaining fuel amount in the 18 gallon fuel tank was calculated to be approximately 3 gallons. During rescue of the pilot, the right wing was further damaged.

Examination of the airplane following recovery by Safety Board personnel revealed both wings were separated, and the hull was fragmented to the location of the flightcrew seats. Flight control continuity was confirmed for roll, pitch, and yaw. The elevator trim cable was connected at the trim tab and continuous to the cockpit control. The solid steel wire of the elevator trim cable was bent near the attach point at the trim tab. Safety Board review of pictures taken immediately before takeoff revealed the elevator trim tab was positioned slight tab trailing edge down. Examination of the pilot's restraint system revealed the webbing of both shoulder harnesses and the webbing of one side of the lapbelt were cut during the rescue process. A cable that secured the pilot's shoulder harness to structure was separated from a thimble at the shoulder harness end of the cable. The shoulder harness cable assembly was retained for further examination. The engine was removed from the airframe, placed on a test stand, and found to operate normally.

Examination of the cockpit revealed the master and both ignition switches were in the on position. The primer was fully in, and the throttle was full forward.

MEDICAL AND PATHOLOGICAL INFORMATION

The pilot sustained serious injuries to his head, with little bruising around his shoulders. He also suffered a broken wrist. There were no broken bones in his legs.

TESTS AND RESEARCH

The airplane was test flown by the kit manufacturer's facility general manager the day before the accident following sign off of the condition inspection. A total of two separate flights lasting a total flight time of approximately 1.0 hour were performed. The general manager reported to the Safety Board a discrepancy with the brakes and a sound in the headset from the strobes were noted. No discrepancies were noted with the engine or flight controls.

Following the flights by the general manager, he briefed the accident pilot about the flight controls, instruments, and was given a cockpit familiarization. After the ground instruction, the airplane was then flown by the accident pilot and the general manager who performed the first takeoff. After takeoff, the accident pilot took the controls and performed slow flight, power-off stalls, and checked the landing gear and flaps. The accident pilot returned for landing and performed a full-stop taxi back landing for a subsequent departure. After departure, he manipulated the throttle control and performed slow flight. The flight returned and an uneventful landing was performed. A discrepancy related to high coolant temperature was noted and the airplane was taxied to the maintenance hangar. Maintenance personnel informed the accident pilot that the coolant temperature was not at red line, moved the red line

limit, and instructed him to maintain 5 mph faster in the traffic pattern in an effort to reduce coolant temperature.

Following instruction by maintenance personnel, the accident pilot and general manager departed and remained in the traffic pattern where two full-stop taxi back landings were performed. The accident pilot added 5 mph while flying in the traffic pattern and no discrepancies were noted. Following the last flight, the accident pilot was advised by the general manager that he should fly more the following morning. The accident pilot agreed to fly solo to get more experience. The general manager reported the airplane had an estimated 1/2 tank remaining following the last landing on November 30, 2007.

Examination of the shoulder harness cables was performed by the Safety Board's Materials Laboratory. The results of the examination revealed the cables were comprised of 1/8 inch diameter corrosion resistant steel cable with 7 strands of 19 wires each. The sleeve, thimble, and attach plate for the pilot's shoulder harness cable were separated from the cable at the location near the shoulder harness attach point. Two strands of the pilot's shoulder harness cable were fractured at a point along the length between the attach point for the airplane and the attach point for the shoulder harness attach. Two additional strands of the cable were fractured at the midpoint of the thimble adjacent to the shoulder harness attach point. The attachment plate remained secured to the thimble of the pilot's shoulder harness cable. The cable also exhibited a 90 degree bend near the middle of the thimble near the shoulder harness attach point. The area of the cable associated with the middle point of the lower thimble exhibited wire thinning associated with sliding contact. Corresponding sliding contact marks were also noted on the thimble surface. Examination of the pilot's sleeve revealed sliding marks in the interior of the sleeve consistent with sliding contact with the wires of the cable.

Additional examination of the shoulder harness cables by the Safety Board's Materials Laboratory revealed all three sleeves had two crimps each. The supplier of the cable and sleeves (Loos and Company, Inc.) indicated that for the cable diameter and type of sleeve (copper duplex oval sleeves P/N SL2-4P), three crimps are required. That company reported on their web site that during manufacture of cables using their sleeves, specified tools from registered trademark company Locoloc should be used. The cable and sleeve manufacturer also reports that the copper duplex oval sleeves are capable of supporting a greater load than the rated breaking strength of the cable to which they are attached when properly applied with the specified tools, and performance is only assured by using the proper swager and sleeve combination. The after swaging diameter of all crimps were measured and found to be within a range of .363 to .368 inch. According to the sleeve manufacturer, the after swage diameter of a properly swaged sleeve is .345 inch.

During manufacture of the cables by the kit manufacturer, two tools both manufactured by the National Telephone Supply Company were used. One tool was a hand tool and the other tool was a bench tool.

Testing of the intact co-pilot's shoulder harness cable was performed by the Safety Board's Materials Laboratory. The results of tension testing which occurred over a four-minute period revealed the peak load achieved was 1,213 pounds. By design the minimum strength of the cable is specified as 1,760 pounds. Examination of the cable after tension testing revealed it was not fractured but the loose end of the cable was displaced from the sleeve. The thimble exhibited sliding contact marks similar to the sliding marks noted on the pilot's side, and the sleeve remained attached to the cable and could not be easily removed by hand. Wires on two of the seven strands near the thimble were disturbed and one of the wires was fractured.

Postaccident examination of the kit builder's facility to inspect manufactured cables used for shoulder harnesses, tail brace wires, and rudder cables was performed by an FAA airworthiness inspector. The inspection revealed that the inspected cables appeared to be correctly swaged. A technician of the kit builder was tasked to swage a sleeve to a cable and the task was correctly performed with the correct tools including a go-no-go gauge. The proper procedures were followed. A representative of the kit manufacturer reported to the FAA inspector that about 1 year prior they had a couple of unsatisfactory employees which were terminated, and they could not determine when or by whom a particular cable assembly was manufactured.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	77,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
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 2 With waivers/limitations	**Last FAA Medical Exam:**	November 6, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	July 25, 2007
Flight Time:	22000 hours (Total, all aircraft), 20 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PORTER GLEN	**Registration:**	N79GP
Model/Series:	AVENTURA II	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental (Special)	**Serial Number:**	AP2A0079
Landing Gear Type:	Amphibian	**Seats:**	2
Date/Type of Last Inspection:	November 29, 2008 Condition	**Certified Max Gross Wt.:**	1150 lbs
Time Since Last Inspection:	1 Hrs	**Engines:**	1
Airframe Total Time:	142.2 Hrs at time of accident	**Engine Manufacturer:**	
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	
Registered Owner:	CLARK THOMAS P	**Rated Power:**	
Operator:	CLARK THOMAS P	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	COF,8 ft msl	**Distance from Accident Site:**	7 Nautical Miles
Observation Time:	12:55 Local	**Direction from Accident Site:**	130°
Lowest Cloud Condition:		**Visibility**	7 miles
Lowest Ceiling:	Broken / 2700 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	40°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.21 inches Hg	**Temperature/Dew Point:**	25°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Rockledge, FL (21FA)	**Type of Flight Plan Filed:**	None
Destination:	(21FA)	**Type of Clearance:**	None
Departure Time:	12:54 Local	**Type of Airspace:**	

Airport Information

Airport:	Rockledge Airport 21FA	**Runway Surface Type:**	Asphalt
Airport Elevation:	27 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	2010 ft / 45 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious	**Latitude, Longitude:**	28.300556,-80.721389(est)

Administrative Information

Investigator In Charge (IIC):	Monville, Timothy
Additional Participating Persons:	William E Miller; FAA/FSDO; Orlando, FL Eric Tucker; Rotax; Nassau
Original Publish Date:	March 5, 2009
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=67186