Aviation Investigation Final Report

Location:	Valkaria, Florida	**Accident Number:**	ERA13FA219
Date & Time:	April 29, 2013, 07:44 Local	**Registration:**	N85KY
Aircraft:	DANIELS DOMINATOR	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot purchased the single-seat gyroplane and then took flying lessons in a gyroplane with a tandem-seating configuration. The pilot recorded about 7.8 hours in two-seat gyroplanes and had no experience in single-seat gyroplanes. On the day of the accident flight, the pilot was anxious to fly the gyroplane before traveling to the northeast for the summer. During his first flight in the single-seat gyroplane, the pilot had just crossed the approach end of runway 14 when the gyroplane pitched down 30 degrees, then pitched up 45 degrees, and subsequently descended to the ground. Witnesses, who were personal friends of the accident pilot, noted that, in their opinion, the pilot was not experienced enough to fly his gyroplane solo. One witness also stated that he was going to test fly the gyroplane for the owner2 days before the accident flight but was unable due to inclement weather . According to the inventor of the gyroplane, and based on his analysis of the accident flight details, the engine power was reduced with the control stick positioned slightly aft of center and that it appeared that the pilot decreased power and airspeed just before entering a vertical descent to the ground.

Toxicological testing revealed therapeutic levels of diphenhydramine (for example, Benadryl) in the pilot's blood samples. Diphenhydramine is a sedating antihistamine that could impair a pilot's cognitive and psychomotor performance. The diphenhydramine in cavity blood (0.038 ug/ml) was slightly above the lower limit of the normal therapeutic range (0.0250 to 0.1120 ug/ml). Diphenhydramine undergoes significant postmortem redistribution; as a result, it is likely that the pilot's diphenhydramine level was most likely at or below the lower therapeutic level about the time of the accident. Therefore, it is unlikely that impairment from diphenhydramine degraded the pilot's ability to safely operate the gyroplane. The clinical findings of an elevated hemoglobin A1C (9.2%) and elevated glucose in the urine is consistent with poorly controlled diabetes. The hemoglobin A1C of 9.2% correlates with an average blood sugar level of about 250 mg/ml (below 140 mg/ml is normal). Blood sugar elevated into this range causes few identified symptoms other than increased urination and is not acutely impairing. However, long-term diabetes can cause loss of vision, neuropathy in the lower limbs, and kidney disease. The investigation could not determine if the pilot had any symptoms from diabetes or its long-term complications.

Examination of the airframe, engine, and flight control system components revealed no evidence of preimpact mechanical malfunctions or anomalies that would have precluded normal operation.

Probable Cause and Findings

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

The pilot's failure to maintain adequate power and airspeed, which resulted in a loss of control, abrupt descent, and impact with terrain. Contributing to the accident was the pilot's failure to obtain adequate experience in the gyroplane before making the flight.

Findings

Aircraft	(general) - Not attained/maintained
Personnel issues	Lack of action - Pilot
Personnel issues	Total experience w/ equipment - Pilot

Factual Information

History of Flight

Approach-VFR pattern final	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On April 29, 2013, about 0744 eastern daylight time, a Daniel J. Danies Dominator gyroplane incurred substantial damage after impacting terrain while in the local traffic pattern at Valkaria Airport (X59), Valkaria, Florida. The light sport pilot sustained fatal injuries. The gyroplane was registered to and operated by a private individual as a 14 Code of Federal Regulations (CFR) Part 91 personal flight. Visual meteorological conditions prevailed and no flight plan was filed for the local flight that departed X59 about 0740.

In an interview with a National Transportation Safety Board (NTSB) investigator, a certified flight instructor who witnessed and videotaped the flight stated that on the morning of the flight, the pilot ran up the engine and did his preflight checks at the approach end of runway 10, which was a closed runway. During this procedure, the pilot turned the engine off and then back on again for an unknown reason. The pilot then started a takeoff roll, engaged the rotor head pre-rotator, the gyroplane jerked to the left, and the pilot aborted the takeoff attempt. On taxi back, the pilot told the witness that the pre-rotator system was slipping. The pilot reached the approach end of runway 10, reengaged the pre-rotor and started a second takeoff roll. The witness stated that the takeoff roll was about 1,500 feet in length, and was an unusually long takeoff roll compared to the other gyroplane takeoffs that he had witnessed in the past.

The witness stated that the rotor blades slowly accelerated and the pilot lifted the aircraft off the runway to about 300 to 400 feet above ground level (agl). The witness added that the rotor blades were not "coning" as the pilot lifted off of the runway. The pilot made a left downwind in the local pattern and then flew over runway 10 at about 50 feet agl. The pilot then overflew the aircraft apron where several aircraft were parked and, as he approached runway 14, he made a left turn for a right downwind and right base turn for runway 14. After crossing the approach end of runway 14, the gyroplane entered a 30 degree pitch down attitude followed by an abrupt 45 degree pitch up attitude. As the gyroplane reached the top of the upward arc, it appeared to have lost much of its airspeed and subsequently began a downward descent. The gyroplane assumed a left wing down attitude just prior to impact with the apron on the east side of runway 14.

The same witness also stated that the pilot had acquired most of his flying experience in powered parachutes. The accident pilot had purchased the gyroplane about 5 months prior to the accident flight. The accident pilot was receiving instruction in dual seat gyroplanes at an off-site location. About two weeks before the accident, the pilot told friends that he had been "signed off" to solo in his single seat gyro. A NTSB investigator asked the witness "in his opinion, was the accident pilot ready to solo?" The witness stated "no."

A personal friend of the accident pilot, with about 160 hours of flight experience in gyroplanes,

performed an uneventful preflight inspection on the accident gyroplane two days prior to the accident. The preflight was conducted so that the witness could conduct an initial test flight of the gyroplane before the accident pilot flew it for the first time; however, he was unable to test fly the gyroplane due to inclement weather at the airport. Prior to his first flight, the accident pilot practiced taxiing the gyroplane around the airport without the rotor blades attached to get a feel for the differential braking. According to the witness, the accident pilot was due to travel to his summer home in the northeastern United States on or about April 30, 2013, and wanted to see it fly before he left. The pilot planned to return to X59 two weeks later to trailer the gyroplane at his summer home. The witness also added that he would not have test flown the gyroplane on the morning of the accident because of the approximate 10 knot winds that were present at the airfield when he arrived at about 0815. The witness stated that the more experience that you have with a gyroplane increases your proficiency of flying in higher winds, and "if you are learning how to fly gyroplanes, you should be doing so with no wind." A NTSB investigator asked the witness "in his opinion, was the accident pilot ready to solo?" The witness stated "no."

Pilot Information

Certificate:	Sport Pilot	**Age:**	58
Airplane Rating(s):	None	**Seat Occupied:**	Single
Other Aircraft Rating(s):	Gyroplane	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Sport pilot None	**Last FAA Medical Exam:**	
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	90.5 hours (Total, all aircraft), 0 hours (Total, this make and model)		

The pilot, age 58 held a sport pilot certificate and a light sport aircraft repairman certificate with a rating for powered parachutes. Both certificates were issued on November 30, 2012. The limitation on the sport pilot certificate included, "holder does not meet International Civil Aviation Organization requirements." The limitation on the repairman certificate was for powered parachute only. A review of the pilot's logbooks revealed that the pilot had recorded 90.5 hours total flight time in powered parachutes, and he recorded 7.8 hours total flight time in two-seat gyroplanes, of which, 6.8 of those hours were logged as pilot-in-command. No time was recorded for single seat gyroplanes. The first endorsement in the pilot's logbook covered Federal Aviation Regulations Part 61.309 and 61.311 on April 6, 2013. The pilot received a signed but undated endorsement for FAR Part 61.309, 61.311, and 61.321 in his logbook by a flight instructor.

Aircraft and Owner/Operator Information

Aircraft Make:	DANIELS	**Registration:**	N85KY
Model/Series:	DOMINATOR	**Aircraft Category:**	Gyroplane
Year of Manufacture:		**Amateur Built:**	Yes
Airworthiness Certificate:	Experimental light sport (Special)	**Serial Number:**	001
Landing Gear Type:	Tricycle	**Seats:**	1
Date/Type of Last Inspection:	April 1, 2013 Condition	**Certified Max Gross Wt.:**	675 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	50 Hrs as of last inspection	**Engine Manufacturer:**	Rotax
ELT:	Not installed	**Engine Model/Series:**	582
Registered Owner:	William Scott Adair	**Rated Power:**	65 Horsepower
Operator:	William Scott Adair	**Operating Certificate(s) Held:**	None

The experimental, amateur-built, single-seat gyroplane, serial number 001, was manufactured in 2009, and was equipped with a fixed-pitched, semi-rigid, teetering, two-blade rotor system. It was powered by an uncertified 65-horsepower Rotax two-cycle engine, serial number 5381074. An uncertificated three bladed composite propeller was attached to the engine. A review of the engine logbooks revealed that a complete overhaul was performed on December 29, 2012. The last condition inspection of the engine was completed on April 1, 2013 at a tachometer time of 49.5 hours. There was no record of the engine total time prior to the engine overhaul. The airframe logbook was not located.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	MLB,33 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	07:53 Local	**Direction from Accident Site:**	300°
Lowest Cloud Condition:	Few	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.03 inches Hg	**Temperature/Dew Point:**	24°C / 18°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Valkaria, FL (X59)	**Type of Flight Plan Filed:**	None
Destination:	Valkaria, FL (X59)	**Type of Clearance:**	None
Departure Time:	07:40 Local	**Type of Airspace:**	

The Melbourne International Airport (MLB), Florida 1153 recorded weather observation, located 10 nautical miles to the northwest, reported wind from 160 degrees at 06 knots, visibility 10 statute miles, few clouds at 3,800 feet, temperature 24°C, dew point 18°C, and an altimeter setting of 30.03 inches of mercury.

Airport Information

Airport:	Valkaria Airport X59	**Runway Surface Type:**	Asphalt
Airport Elevation:	26 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	14	**IFR Approach:**	None
Runway Length/Width:	4000 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	27.951665,-80.551391(est)

The gyroplane came to rest about 400 feet inside the approach end of runway 14 on the north side apron, against a Cessna 172 parked on the ramp. The debris path bore 117 degrees magnetic at a width of 60 feet and a length of 80 feet.

Initial examination of the gyroplane by a Federal Aviation Administration (FAA) inspector and a National Transportation Safety Board (NTSB) investigator revealed that the gyroplane incurred substantial damage to the rotor blades, fracturing of the keel, and bending damage to the frame.

Pitch, roll, and yaw control continuity was verified on all control surfaces. The left rotor pitch control tube was severed by the propeller. The right rotor pitch control tube failed due to bending overload. The rudder and horizontal surfaces remained attached to each other, departed the airframe, and were cracked about 8 inches upward from the bottom of the vertical stabilizer. Suction and compression were verified on both engine cylinders and crankshaft continuity was verified through the engine to the accessory drive ring gear by rotating the propeller blades manually. Examination of the recovered airframe, engine, and flight control system components revealed no evidence of pre-impact mechanical malfunctions or anomalies that would have precluded normal operation.

A detailed summary of the airframe and engine examination is contained in the public docket.

Medical and Pathological Information

A postmortem examination was conducted by the Brevard County Medical Examiner's office. The cause of death was reported as blunt force injuries.

The FAA's Civil Aerospace Institute (CAMI) performed forensic toxicology on specimens from the pilot. The report stated that there was no carbon monoxide or ethanol detected in the specimens provided. The report also stated that 0.038 (ug/ml, ug/g) of diphenhydramine was detected in the blood and urine. Diphenhydramine (commonly known by the trade name Benadryl) is an over-the-counter antihistamine with sedative effects, often used to treat allergy symptoms or as a nighttime sedative." The therapeutic range is considered 0.025 to 0.112 ug/ml according to the FAA Civil Aeronautical Institute. There was 484 (mg/dl) of glucose detected in the urine. Urine levels above 100 mg/dL are considered abnormal. 9.2 % of hemoglobin A1C was detected in the blood (Cavity). Hemoglobin A1C blood levels above 6% are considered abnormal. These findings are consistent with a pilot who has diabetes. According to the National Highway Traffic Safety Administration report, Drugs and Human Performance Fact Sheets: Diphenhydramine: Diphenhydramine clearly impairs driving performance, and may have an even greater impact than does alcohol on the complex task of operating a motor vehicle. Laboratory studies have shown diphenhydramine to decrease alertness, decrease reaction time, induce somnolence, impair concentration, impair time estimation, impair tracking, decrease learning ability, and impair attention and memory within the first 2-3 hours post dose. Significant adverse effects on vigilance, divided attention, working memory, and psychomotor performance have been demonstrated.

Additional Information

In a personal interview with the inventor of this gyroplane, he stated that the Dominator gyroplane is an inherently stabile machine. During flight, the gyroplane is designed to use the rotor speed to safely descend to the ground with little or no power. In reviewing the accident sequence, the inventor stated that the initial approach to runway 14 appeared normal. He stated that it appeared that the pilot seemed to "check" (decrease) his speed just prior to entering a vertical descent to the ground. He stated that the only way to get the gyroplane into this configuration is to have reduced power and the control stick slightly aft of center.

The pilot received instruction on dual seat gyroplanes with a tandem configuration. According to FAA records, the pilot had previously met the 14 CFR Part 61 requirements for a light sport aircraft certification. Per 14 CFR Part 61.321, the pilot was adding an additional category or class of aircraft to his existing light sport certification.

According to 14CFR Part 61.317, a sport pilot certificate does not list aircraft category and class ratings. When a candidate successfully passes the practical test for a sport pilot certificate, regardless of the light sport aircraft privileges sought, the FAA will issue a sport pilot certificate without any category and class ratings. The qualified instructor pilot will provide the pilot with a logbook endorsement for the category and class of aircraft in which the pilot is authorized to act as pilot in command. In this case, the pilot received training in a gyroplane with two seats and was not required to solo in order to receive the two logbook endorsements required by 14 CFR Part 61.321. The pilot had no recorded experience flying fixed-wing aircraft, rotary-wing aircraft, or single seat gyroplanes; nor was he required by the FARs to demonstrate a satisfactory solo flight upon completion of an approved training program.

Administrative Information

Investigator In Charge (IIC):	Murray, Patrick
Additional Participating Persons:	Cheryl White; FAA/FSDO; Orlando, FL
Original Publish Date:	January 27, 2015
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=86750

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.