Aviation Investigation Final Report

Location:	Avon Park, Florida	**Accident Number:**	ERA11GA066
Date & Time:	November 17, 2010, 20:53 Local	**Registration:**	N1309
Aircraft:	Cessna M337B	**Aircraft Damage:**	Substantial
Defining Event:	Aircraft structural failure	**Injuries:**	3 Fatal
Flight Conducted Under:	Public aircraft		

Analysis

Prior to the flight, the crew attended a mass briefing with the military training exercise personnel for whose operations the flight was to provide aerial support. The briefing included weather forecast information but did not include any indication of rain showers, thunderstorms, or other hazardous weather over the military operations area or near the landing airport for the period of operations. During the flight, the weather in the area began to deteriorate. Other pilots, ground personnel, and witnesses reported periods of heavy rain and reduced visibility. Infrared satellite imagery for the time period of the accident flight depicted an area of cumulus congestus cloud development over south-central Florida, north of a stationary frontal boundary, moving north. Ground personnel were monitoring the deteriorating weather as the accident airplane continued its mission. Although there may have been discussions of a weather recall, the evidence indicates that this did not occur. The accident pilot likely discontinued his mission and initiated a return to the airport due to the weather conditions. The airplane was not equipped with weather radar. As the airplane approached the airport from the north in night conditions, it encountered the edge of an area of echoes with a maximum core reflectivity of 55 decibels; such echoes are capable of producing severe turbulence and strong outflow winds. The right wing separated in flight, and the airplane crashed inverted in a farm pasture west of the airfield. An examination of the wreckage did not reveal evidence of a preexisting mechanical malfunction or failure. All observed fracture surfaces on the right wing showed indications of overstress.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's inadvertent encounter with an unexpected intense rain shower with severe turbulence at night.

Findings

Environmental issues	(general) - Contributed to outcome
Organizational issues	Oversight of operation - Other government

Factual Information

History of Flight

Approach	VFR encounter with IMC
Approach	Turbulence encounter
Approach	Aircraft structural failure (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On November 17, 2010, about 2050 eastern standard time, a Cessna M337B, N1309, impacted terrain following an in-flight separation of the right wing near Avon Park, Florida. The airplane was registered to a private individual and the public use flight was operated by Patriot Technologies LLC under contract with the Department of Defense. The commercial pilot and two pilot-rated crewmembers were killed. Night instrument meteorological conditions were present in the area, and no Federal Aviation Administration (FAA) flight plan was filed. The local flight originated at MacDill Air Force Base Auxiliary Field (AGR), Avon Park, Florida, about 1932.

According to the operator, the purpose of the flight was to provide aerial support to an Air Force Special Operations Command (AFSOC) training exercise. The flight, using call sign "Jedi 21," was in contact with AGR tower at the time of the accident. Tower instructed Jedi 21 to report a two-mile final for runway 5. When Jedi 21 did not report final, a search and rescue response was initiated. The wreckage was located about 0118 on November 18.

Several Department of Defense personnel were on the Avon Park Air Force Range at the time of the accident. These persons included range and airspace controllers, a weather forecaster, and other flight crews.

An Air Force Staff Sergeant, acting as a primary Restricted Operating Zone (ROZ) controller, reported the following. Jedi 21 checked in on station and worked on his frequency for about an hour, until he reported a "bent sensor." According to the operator, "bent sensor" is an Air Force Tactics, Techniques, and Procedures Manual 3-1 standard communication term indicating a technical anomaly with sensor equipment. The ROZ controller continued to work with Jedi 21 for about 30 more minutes before checking off station uneventfully.

An Air Force Tech Sergeant, also working ROZ controller duties, reported the following. About 2040, he received a call from Jedi 21 stating that the flight was returning to base (RTB). The controller requested the reason for the RTB, and reportedly received no response from Jedi 21. The controller further stated that they were tracking weather in the area to determine if returning other flights to base was warranted. About 15 minutes later, or about 2055, AGR

tower called him and inquired as to the location of Jedi 21. The controller believed at the time that Jedi 21 had landed. About the same time, the "…weather conditions became severe at AGR with heavy rain and limited visibility."

An Air Force Staff Sergeant, performing communications link duties between range control, AGR tower, and ROZ control, reported the following. He heard the RTB call from Jedi 21 to the ROZ controller. When the controller asked for the reason for the RTB, no response was heard. About 2045, Jedi 21 called "inbound to Avon Aux Field (AGR)." He then heard Jedi 21 call 4 miles from AGR, which was the last radio call he heard from Jedi 21. He added that, about 2055, the "weather significantly grew worse with heavy rain at the Avon Field."

An Air Force Staff Sergeant, performing weather forecaster duties, reported the following. He began to prepare for the 1830 evening mass briefing about 1500, and stated, "...conditions looked to be on track with relatively clear skies." He recalled that, before the mass briefing, mid-level cloud cover increased at around 7,000 to 8,000 feet with some scattered clouds to the south at about 4,000 feet. He noted some weak returns on the radar to the south but felt that they would "die out relatively quickly" with the loss of heating as the evening progressed. His overall assessment of the synoptic situation and weather on the night of the accident is that "there was no significant weather event during the operation other than a brief heavy shower." He also stated that the showers did not occur until after communication was lost with the accident airplane.

In a timeline attached to his written statement, the forecaster reported that between 1930 and 2000, he continued to monitor weather to the south and could see showers continuing to "back build" on radar to the southwest, tracking northeast. He notified exercise command of a possible recall of light and medium fixed wing aircraft and requested a pilot report from the south ROZ with no response. About 2010, he received a pilot report of 3,000 foot ceilings and rain to the south. During the time period of 2015 to 2030, he contacted tower to recommend a recall of visual flight rules (VFR) aircraft due to worsening conditions with rain and lowering ceilings. He reported that, at 2035, tower recalled light and medium fixed wing aircraft. From 2040 to 2050, he continued to monitor the weather conditions, and from 2050 to 2055, a brief, heavy shower moved through, reducing visibility to between 1 and 2 statute miles.

An H60 helicopter pilot, who was transitioning from south to north on the Avon Park Range between 2030 and 2100, reported that the weather was "worse than briefed." He stated that his aircraft flew through numerous rain showers with visibilities between 1 and 2 miles. At 2015, while arriving at AGR, they experienced "0 – 0" conditions (zero ceiling and visibility) over the field. After slowing the aircraft, he was able to regain contact with the ground and land.

Another Patriot Technologies Group aircraft was airborne on the Avon Park Range at the time of the accident. He attended the mass briefing prior to the flight and recalled that, during the briefing, there was no mention of any precipitation or convective activity throughout the flying period. He departed AGR about 1920 and arrived on station about 1935. He recalled that, the weather "began to change rapidly and deteriorate with weather moving from south to north."

He was forced to deviate from the mission to remain in VFR conditions. About 2120, unable to maintain VFR, he elected to abort his mission and land at Avon Park Executive Airport (AVO). At 2130 he attempted to land at AVO, but weather prevented the approach. He held over Sebring Airport (SGF) until about 2200, when he reattempted an approach at AVO. He stated that, he did not "receive any additional weather information throughout the flight" and did not "receive a weather recall." He added that he was in continuous radio contact with the command and control center and was monitoring UHF and VHF guard frequencies during the entire flight.

A witness was outside at his residence at the time of the accident. He reported that he lived 1 to 2 miles north of the accident site. He stated the following. It was dark at the time and it had just started sprinkling. He heard the airplane, but did not see it. He described the sound as "at full throttle, like it was pulling out of a dive." He then heard a "thud" sound and he knew the airplane had crashed. He called 911 and told the operator that a plane had crashed between his location and Avon Park. He said that there was no explosion. Immediately after the accident, it started raining hard. He was drenched because he needed to be outside to get good reception on his phone. He did not see the wreckage until the next morning.

A second witness was outside, on his back porch, about 3/4 mile from the accident site, at the time of the accident. He was talking on the phone to his daughter. He did not see the airplane or the crash, but he heard the airplane fly near his house. The airplane sounded like it was traveling in a northerly direction. He stated that the airplane sounded normal, and then it sounded like a "dive bomber, rolling into a dive." The engine rpm's increased audibly until he heard the airplane crash. He got off the phone and called 911 because he knew an airplane had crashed. He stated that a "terrible storm" hit a few minutes after the accident, and lasted for about 10 minutes. There was a lot of rain, but no thunder or lightning. The rain was so intense that it filled up his gutters, which he had just cleaned out.

A search of recorded radar data from nearly facilities revealed a primary target on a south-southeasterly heading, and the radar data terminated at a point approximately collocated with the accident site. The time of the last recorded radar point was 2050. No altitude or airspeed data was captured, and the data source was not positively identified as coming from the accident airplane.

PERSONNEL INFORMATION

The certificated commercial pilot, who was acting as pilot-in-command and was seated in the left cockpit seat, held airplane single and multi-engine land ratings and an instrument airplane rating. He was also a certificated flight instructor. He reported 6,200 civilian flight hours on his FAA second-class medical certificate application, dated December 29, 2009.

According to a pilot history form provided by the operator, dated October 5, 2010, the pilot reported 10 hours total time in the Cessna 337/O-2. He also reported about 3,500 military flight hours.

A certificated private pilot was seated in the right cockpit seat. According to the operator, he was assigned duties to support the training exercise that included operating on-board tactical equipment. A certificated commercial pilot was seated in the aft, right seat. He was assigned duties that included operating on-board communications equipment.

According to the operator, the duties of the crewmember occupying the right cockpit seat did not include flying the airplane.

AIRCRAFT INFORMATION

The airplane was a Cessna M337B, serial number 337-M0015. The airplane was originally built as an O-2A for the U.S. Air Force. It was powered by two Continental model IO-360-D engines, each rated at 210 horsepower at 2,800 rpm. The airplane was not equipped with weather radar.

A review of the aircraft maintenance records indicated that an annual inspection of the airframe and engines was performed on October 14, 2010. The aircraft total time at the time of the annual inspection was 5,566.9 hours. The forward engine time since overhaul was 1,260.3 hours and the rear engine time since overhaul was 1,111.8 hours.

On October 11, 2010, an eddy current inspection of the bolt holes in the horizontal flanges of the lower cap of the front wing spar and jack point was performed. The inspection was performed in accordance with Cessna Multi-Engine Service Letter 78-2. According to the inspection documents, no discrepancies were found.

METEOROLOGICAL INFORMATION

The National Weather Service (NWS) Surface Analysis Chart and satellite imagery for 1900 and 2200 depicted a stationary front extending east-to-west over southern Florida, south of the accident site. A regional radar mosaic chart identified, in the area of the accident, an east-to-west band of echoes. Infrared satellite imagery surrounding the time period of the accident depicted an area of cumulus congestus type cloud development over south-central Florida, north of the stationary frontal boundary. No defined cumulonimbus or thunderstorms were identified in the immediate vicinity of the accident site.

Doppler radar images at 2052 depicted the accident site under the leading edge of an area of echoes with a maximum core reflectivity of 55 decibels (dBZ) located about one-half mile east of the accident site. The next radar scan at 2057 depicted echoes of 35 to 45 dBZ over the accident site with the edge of the 50 dBZ core located about one-eighth mile east of the accident site. FAA advisory circular (AC) 00-45B correlates echoes of 50 to 55 dBZ with video integrator and processor (VIP) level 5 “intense” intensity echoes capable of producing severe turbulence and strong outflow winds. No lightning activity was observed in the area of the echoes.

AGR does not have weather reporting facilities. The 2055 weather observation for Bartow, Florida (BOW), located 28 miles northwest of AGR included the following: surface winds from 100 degrees at 6 knots, sky clear, visibility 10 statute miles, temperature 21 degrees Celsius, dew point 19 degrees Celsius, and altimeter setting of 30.12 inches of mercury. Other stations surrounding the accident site reported visual flight rules weather conditions near the time of the accident.

A mass weather briefing was provided by the Air Force Weather Service prior to the accident flight. The briefing was conducted by an Air Force forecaster utilizing a color-coded briefing slide. The briefing did not include any indication of rain showers, thunderstorms, or other hazardous weather over the military operations area or in the terminal area of AGR during the period of operations.

A detailed Meteorological Factual Report with accompanying graphics is contained in the public docket for this accident.

WRECKAGE AND IMPACT INFORMATION

The main wreckage was found adjacent to a retention pond and swamp that were located on a farm pasture. The initial impact crater, measuring 7 feet wide by 9 feet long by 3 feet deep, contained the cockpit instrument panel, forward engine, forward propeller hub, and one blade of the forward propeller. A ground scar consistent with the thickness and length of the left wing leading edge was adjacent to the impact crater.

The wreckage path was oriented on a heading of about 130 degrees. The left and right tail booms, vertical stabilizers and rudders, horizontal stabilizer, elevator, and a section of the left wing were found in the retention pond. The aft engine was resting inverted on the edge of the pond. All propeller blades were located within the area of the main wreckage.

Two sections of the right wing were found northwest of the main wreckage impact crater. The outboard section of the right wing, from the inboard edge of the aileron to the wing tip, was found about 800 feet northwest of the impact crater. The aileron remained attached. Another section of the right wing, which included a section of right wing flap, was found about 330 feet northwest of the impact crater.

The wreckage was recovered to a storage facility in Groveland, Florida where a more detailed examination of the wreckage was performed. An examination of the wreckage revealed no evidence of preexisting mechanical anomalies. All fracture surfaces that were examined exhibited evidence of overload failure. Sections of the right wing front and rear spars and associated wing skin were sent to the NTSB Materials Laboratory in Washington, DC for examination of the fracture surfaces. Optical examinations of the fractures revealed features and deformation patterns consistent with overstress fracture at all locations. No indications of preexisting cracking such as fatigue or corrosion were uncovered.

For additional information regarding the examination of the aircraft systems and structure, refer to the Structures and Systems Factual Report and the Materials Laboratory Factual Report, located in the public docket for this accident.

MEDICAL AND PATHOLOGICAL INFORMATION

Postmortem examinations of the pilot and crewmembers were performed at the Office of the District 10 Medical Examiner, Winter Haven, Florida. The autopsy reports noted the cause of death for all occupants as blunt force trauma.

Forensic toxicology was performed on specimens of the pilot and crewmembers by the FAA Bioaeronautical Sciences Research Laboratory (CAMI), Oklahoma City, Oklahoma. The CAMI toxicology reports for the pilot and front, right seat occupant indicated negative for drugs and ethanol. The rear seat occupant tested negative for drugs but positive for ethanol in the muscle, lung, liver, and kidney. Testing for carbon monoxide and cyanide was not performed on any occupant of the airplane.

TESTS AND RESEARCH

Airborne Mapping System

The airplane was equipped with an AeroComputers, Inc. UC5100 tactical mission management system. Memory cards from the unit were sent to the NTSB Vehicle Recorder Division, Washington, DC, for general examination and download of data.

The UC5100 recorded 46 flight history files. The flight history file corresponding to the accident flight was reviewed and the data was extracted using information provided by AeroComputers. The data included the entire accident flight up to about 2045, or 8 about minutes prior to the accident. The UC5100 system is not essential to the operation of the airplane and the crew can power down the system when it is not required. According to AeroComputers, operators normally power down the system when the mission is complete. Additional information regarding the UC5100 data extraction is included in the Recording Devices Factual report, located in the public docket for this accident.

Pilot Information

Certificate:	Commercial; Flight instructor	**Age:**	57,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	December 29, 2009
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 14, 2010
Flight Time:	9700 hours (Total, all aircraft)		

Other flight crew Information

Certificate:	Private	**Age:**	48,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 2, 2008
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	220 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N1309
Model/Series:	M337B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0015
Landing Gear Type:	Retractable - Tricycle	**Seats:**	3
Date/Type of Last Inspection:	October 14, 2010 Annual	**Certified Max Gross Wt.:**	4300 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	5567 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-360-D
Registered Owner:	SAVELY ROBERT S	**Rated Power:**	210 Horsepower
Operator:	Patriot Technologies Group LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	BOW,125 ft msl	**Distance from Accident Site:**	4 Nautical Miles
Observation Time:	20:55 Local	**Direction from Accident Site:**	80°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	100°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	21°C / 19°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Avon Park, FL (AGR)	**Type of Flight Plan Filed:**	None
Destination:	Avon Park, FL (AGR)	**Type of Clearance:**	None
Departure Time:	19:20 Local	**Type of Airspace:**	

Airport Information

Airport:	MacDill AFB Auxiliary Field AGR	**Runway Surface Type:**	Asphalt
Airport Elevation:	68 ft msl	**Runway Surface Condition:**	Unknown
Runway Used:	05	**IFR Approach:**	None
Runway Length/Width:	8000 ft / 150 ft	**VFR Approach/Landing:**	Traffic pattern

Wreckage and Impact Information

Crew Injuries:	3 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	27.63861,-81.416389

Administrative Information

Investigator In Charge (IIC):	Hicks, Ralph
Additional Participating Persons:	Michael Singleton; FAA/FSDO; Tampa, FL Henry Soderlund; Cessna Aircraft Company; Wichita, KS Steven McShea; Patriot Technologies Group LLC; Washington, DC
Original Publish Date:	February 16, 2012
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=77833