National Transportation Safety Board
Aviation Accident Final Report

Location:	Miami Gardens, FL	**Accident Number:**	ERA11FA274
Date & Time:	05/02/2011, 0809 EDT	**Registration:**	N18R
Aircraft:	BEECH E18S	**Aircraft Damage:**	Substantial
Defining Event:	Loss of control in flight	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 135: Air Taxi & Commuter - Non-scheduled		

Analysis

After taking off from runway 9L at his home airport and making an easterly departure, the pilot, who was also the president, director of operations, and chief pilot for the on-demand passenger and cargo operation, advised the air traffic controller that he was turning downwind. According to witnesses, the airplane did not sound like it was developing full power. The airplane climbed to about 100 feet, banked to the left, began losing altitude, and impacted a tree, a fence, and two vehicles before coming to rest in a residential area. A postcrash fire ensued, which consumed the majority of the cabin area and left wing. Examination of the accident site revealed that the airplane had struck the tree with its left inboard wing about 20 feet above ground level. Multiple tree branches exhibiting propeller cuts were found near the base of the tree. Propeller strike marks on the ground also corresponded to the location of the No. 1 (left side) propeller. There were minimal propeller marks from the No. 2 (right side) propeller. Examination of the propellers revealed that the No. 1 propeller blades exhibited chordwise scratching and S-bending, consistent with operation at impact, but the No. 2 propeller blades did not exhibit any chordwise scratching or bending, which indicates that the No. 2 engine was not producing power at the time of impact.

There was no evidence that the pilot attempted to perform the manufacturer’s published single engine procedure, which would have allowed him to maintain altitude. Contrary to the procedure, the left and right throttle control levers were in the full-throttle position, the mixture control levers were in the full-rich position, neither propeller was feathered, and the landing gear was down.

Postaccident examination of the No. 1 engine revealed no evidence of any preimpact malfunction or failure. However, the No. 2 engine's condition would have resulted in erratic and unreliable operation; the engine would not have been able to produce full rated horsepower as the compression on four of the nine cylinders was below specification and both magnetos were not functioning correctly. Moisture and corrosion were discovered inside the magneto cases; the left magneto sparked internally in a random pattern when tested and its point gap was in excess of the required tolerance. The right magneto's camshaft follower also exhibited excessive wear and its points would not open, rendering it incapable of providing

electrical energy to its spark plugs. Additionally, the main fuel pump could not be rotated by hand; it exhibited play in the gear bearings, and corrosion was present internally.

When the airplane was not flying, it was kept outdoors. Large amounts of rain had fallen during the week before the accident, which could have led to the moisture and corrosion in the magnetos. Although the pilot had been having problems with the No. 2 engine for months, he continued to fly the airplane, despite his responsibility, particularly as president, director of operations, and chief pilot of the company, to ensure that the airplane was airworthy. During this period, the pilot would take off with the engine shuddering and would circle the departure airport to gain altitude before heading to the destination. On the night before the accident, the director of maintenance (DOM) replaced the No. 1 cylinder on the No. 2 engine, which had developed a crack in the fin area and had oil seeping out of it. After the DOM performed the replacement, he did not do a compression check or check the magnetos; such checks would have likely revealed that four of the remaining cylinders were not producing specified compression, that the magnetos were not functioning correctly, and that further maintenance was necessary. Review of the airplane's maintenance records did not reveal an entry for installation of the cylinder. The last entry in the maintenance records for the airplane was an annual and a 100-hour inspection, which had occurred about 11 months before the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot’s improper response to a loss of power in the No. 2 engine and his failure to ensure that the airplane was airworthy. Contributing to the accident was the inadequate engine maintenance by the operator's maintenance personnel.

Findings

Aircraft	Aircraft power plant - Incorrect service/maintenance (Factor) Aircraft power plant - Failure
Personnel issues	Maintenance - Maintenance personnel (Factor) Use of policy/procedure - Pilot (Cause)

Factual Information

HISTORY OF FLIGHT

On May 2, 2011, about 0809 eastern daylight time, a Beech E18S, N18R, was substantially damaged when it impacted terrain in Miami Gardens, Florida. The airline transport pilot was fatally injured. The airplane was registered to Aircap Management Company Inc., and was operated under the provisions of 14 Code of Federal Regulations (CFR) Part 135. Visual meteorological conditions prevailed, and a flight plan had been filed for the non-scheduled international cargo flight which departed from Opa-Locka Executive Airport (OPF), Opa-Locka, Florida, destined for Marsh Harbour International Airport (MYAM), Marsh Harbour, Bahamas.

According to recorded communications from the OPF air traffic control tower, after takeoff for an "East departure" from runway 9L at OPF, the pilot advised that he was "turning downwind" According to witness statements, just after takeoff, the airplane did not sound like it was developing full power. The airplane then climbed to approximately 100 feet, banked to the left, and "slowly" began losing altitude. It then impacted a tree, a fence, and two vehicles before coming to rest in a residential area. A post crash fire then ensued.

PERSONNEL INFORMATION

According to Federal Aviation Administration (FAA) records, the pilot held an airline transport pilot certificate with a rating for airplane multi-engine land. His most recent FAA second-class medical certificate was issued on April 25, 2011. He reported 6,400 total hours of flight experience on that date.

AIRCRAFT INFORMATION

The accident aircraft was a twin-engine, low-wing, conventional-gear airplane of all metal semi-monocoque construction. It was powered by two 450 horsepower Pratt & Whitney R-985-AN-14B, 9-cylinder, radial engines.

The airplane had previously been involved in an accident on November 6, 2007 when it collided with another airplane during taxi at OPF and had been repaired and returned to service.

According to FAA and airplane maintenance records, the accident airplane was manufactured in 1957. The airplane’s most recent annual inspection was completed on June 30, 2010. At the time of the inspection, the airplane had accumulated 13,198.5 total hours of operation.

METEOROLOGICAL INFORMATION

The reported weather at OPF at 0753, included: winds 110 degrees at 12 knots, 10 miles visibility, a few clouds at 2,800 feet, temperature 26 degrees C, dew point 20 degrees C, and an altimeter setting of 30.08 inches of mercury.

AIRPORT INFORMATION

According to the Airport Facility Directory, OPF was a public use airport. It had three runways, oriented in a 12/30 and 09/27 (left and right), configuration. Runway 9L was grooved asphalt, in good condition. It was 8,002 feet long by 150 feet wide.

WRECKAGE AND IMPACT INFORMATION

The accident site was located approximately 1,753 feet northeast of the departure end of runway 9L. Examination of the accident site revealed that the airplane had initially struck the tree with its left inboard wing at an approximate height of 20 feet above ground level and multiple tree branches which exhibited propeller cuts were found near the base of the tree. Ground scarring on the street which corresponded to the airplane's flight path also existed on a 055 degree magnetic heading leading from the tree to the impact point with the fence and the two vehicles. Further examination of the ground scarring revealed the presence of tire marks on both sides of the ground scarring and propeller strike marks on the left side of the ground scarring which corresponded to the location of the No. 1 propeller. Minimal propeller marks were evident on the right side of the ground scarring.

Examination of the main wreckage revealed no evidence of preimpact failure or malfunction of the airplane or flight controls. The airplane after impacting the fence and two vehicles had come to rest with the left wing root and forward side of the nose section against one of the vehicles that it had impacted.

The No.1 engine and its cowling were separated from their mounting location and were found lying near the left side of the fuselage against the other vehicle. The No.2 engine and its cowling were found to have separated from their mounting location and were discovered against the south wall of a residence. The cowl flaps were open on both of the engine's cowlings.

The majority of the cabin area, and the left wing were consumed by a post crash fire. The right wing was separated from its mounting location and exhibited areas of crush and compression damage and a large area of deformation similar in size to one of the concrete block fence support columns. The empennage also exhibited impact damage.

Examination of the landing gear system revealed that the landing gear was in the down position. The main landing gear drag legs were in the over center position, and the slide for the tailwheel was at its travel limit.

Flight control continuity was confirmed from the aileron on the right wing, the aileron on the surviving outboard portion of the left wing, and the elevators, and rudders on the empennage to the breaks in the system and then to the cockpit.

Examination of the cockpit revealed that both the left and right throttle control levers were in the full-throttle position. The mixture control levers were in the full-rich position, the propeller pitch control levers were full forward, and both fuel selector valves were in the main wing tank positions.

Examination of the fuel system revealed that despite the post impact fire, approximately 9 gallons of fluid consistent with 100LL aviation gasoline was still present in the right main tank. When the fluid was applied to a coupon containing water finding paste, the paste did not change color indicating that no water was present.

There was no evidence of any preimpact failure or malfunction of the propellers. Examination of the propellers revealed that the No.1 propeller's blades exhibited evidence of chordwise scratching and S-bending but, the No.2 propeller's blades did not. Neither propeller was feathered.

The spinners and spinner bulkheads exhibited impact damage but did not exhibit any evidence of preimpact cracking. The propeller blades were still attached to their hubs and the pitch

change mechanisms were intact and showed no evidence of any preimpact damage. Further examination revealed no evidence of a blade angle split, rotational, lateral, or longitudinal play of the blades, or worn links. The blade tapes which were also present on the blades and the blade clamps were aligned, and did not reveal evidence of the blades having moved in the blade clamps. Examination of the hub assembly also did not reveal any evidence of any preimpact grease leaks, oil leaks, or cracking.

Examination of the No.1 engine revealed no evidence of any preimpact malfunction or failure. Its compression was within specifications on the majority of its cylinders, and the others exhibited impact damage. The main fuel pump rotated freely, and the left magneto produced spark. The right magneto was impact damaged but, internal examination revealed no evidence of preimpact malfunctions.

Examination of the No.2 engine revealed however, that the compression on four of the nine cylinders was below specification and there were metallic particles suspended in the oil. The main fuel pump could not be rotated by hand, it exhibited play in the gear bearings, and corrosion was present internally. Both magnetos contained moisture and corrosion internally. The left magneto when tested would spark internally in a random pattern and its point gap was in excess of the required tolerance. The right magneto's camshaft follower exhibited excessive wear, and its points would not open.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the Miami-Dade County Medical Examiner Department.

Toxicological testing of the pilot was conducted by the FAA Bioaeronautical Sciences Research Laboratory, Oklahoma City, Oklahoma. The specimens were negative for basic, acidic, and neutral drugs. Carbon Monoxide and Cyanide were detected in blood consistent with the pilot's exposure to a post impact fire.

TESTS AND RESEARCH

According to the president of the shipping company whose cargo was onboard the airplane at the time of the accident, the airplane had been "down" most of the previous month. At first there was a problem with the tail of the airplane, and then approximately a week before the accident a cylinder went "bad". The pilot had called her and advised that even though he had a flight scheduled for another customer, as soon as the plane was fixed, her cargo would be first as she had been waiting for awhile.

According to witnesses, the airplane was kept outdoors when not flying and the local area had been experiencing large amounts of rain during the week before the accident.

The pilot had been having problems with the right engine for months and the pilot would takeoff with the engine "shuddering" and would circle his departure airport to gain altitude before heading to his destination. Then on the night before the accident witnesses observed maintenance being performed on the right engine while it was being illuminated by an automobile with its headlights on.

According to the mechanic, the maintenance performed was to replace the No.1 cylinder on the No.2 engine which had developed a crack in the fin area and had oil seeping out of it. After the

mechanic performed the replacement he did not do a compression check or check the magnetos and stated that he had entered the replacement in the discrepancy log that was kept in a clipboard in the airplane.

When asked about how maintenance was being tracked for the airplane the mechanic stated that he had gotten a bulletin board and all of the inspections were tracked on the board. When asked what the total time on the airplane was when the cylinder was replaced the mechanic could not recall.

During review of the airplane's maintenance records, a loose production limitation record (FAA form 8130-3), dated April 27, 2011 was discovered inside the aircraft logbook for the replacement cylinder however, no logbook entry was discovered for installation of the cylinder.

Further review revealed that the last entry in the maintenance records for the airplane was an annual and 100 hour inspection which had occurred on June 30, 2010, approximately 11 months prior to the accident.

Examination of a checklist associated with the 100 hour inspection revealed that during each 100 hour inspection the mechanic was required to check the magnetos for condition and attachment, and to inspect the magneto breaker compartments for cleanliness, the breaker points for pitting, cam followers for operation and lubrication, and to check for specified grounding, wear, and security.

No further entries regarding any inspections, repairs, alterations, part replacements, oil changes, or preventive maintenance that may have been performed after the 100 hour inspection were discovered in any of the maintenance records.

Weight and Balance Information

A review of the cargo manifest, airplane logbooks, fueling information, and flight plan revealed that the airplane departed OPF with 4 hours of fuel onboard and 1,650 pounds of cargo which consisted of computer supplies, marine supplies, auto parts, audio speakers, coffee, gift items, and clothing.

Review of the flight handbook revealed that given the empty weight of the airplane, and the fuel and cargo onboard the airplane, the airplane's operating weight for the accident flight was approximately 1,000 pounds less than the published maximum gross weight of 10,100 pounds.

Single-Engine Operation

Emergency procedures for single-engine operation along with graphs showing the effects of weight and outside air temperature on single engine climb were included in the manufacturer's flight handbook for the airplane. According to the manufacturer, at maximum gross weight with the airplane properly configured with only one engine operating the airplane could climb 255 feet per minute at sea level and 165 feet per minute at 5000 feet. Under the same weight and power conditions the absolute ceiling for the airplane was approximately 8,900 feet.

The optimum single-engine rate of climb speed at sea level was 116 mph indicated air speed (IAS). This would have been visible to the pilot as the "blue line" on the airspeed indicator. According to the manufacturer, maintaining this speed is of "extreme importance" if best aircraft performance is to be attained during emergency conditions. The calculation of this speed was based on a compromise between best angle-of-climb speed and best rate-of-climb

speed and would produce the best angle-of-climb possible without appreciably reducing the rate-of-climb.

When one engine was shutdown, directional control, altitude, and safe airspeed, could be maintained by using maximum power from the operating engine, and corrective action with the flight controls. The first effect from unbalanced power from an inoperative engine would be the airplane's tendency to yaw towards the inoperative or "dead" engine. This characteristic is aggravated when power from the operating engine is increased, but can be corrected by application of rudder. Rudder forces could then be trimmed out with the trim tab.

The amount of rudder trim necessary to give straight flight depends on airspeed; if the airplane is first trimmed and the airspeed is then decreased, the rudder trim becomes less effective and allows the airplane to turn into the dead engine. If the power is reduced, or if the control column is moved forward to increase airspeed, the trim would become more effective and the airplane would turn into the good engine. The airplane's minimum single-engine control speed which was the lowest airspeed at which a safe margin of control could be maintained when one engine was dead and the other engine was operating at maximum rated power was 94 miles an hour IAS.

In order to properly configure the airplane, the basic single engine procedure required the following preliminary steps:

1. "Operative engine-Add power to maintain altitude and airspeed".

2. "Inoperative engine: Mixture control- IDLE CUT-OFF".

3. "Inoperative engine: Propeller-FEATHER".

4. "Landing gear-UP".

Engine Failure During Takeoff or Climb

According to the manufacturer, before each takeoff the pilot should consult the accelerate-stop graph to determine their decision speed and deceleration distance for the maximum load condition and:

1. If an engine failure occurred during takeoff and there was sufficient runway remaining for deceleration to "CUT POWER IMMEDIATELY AND STOP STRAIGHT AHEAD".

2. If there was insufficient runway remaining and the airplane had not gained best single-engine angle of climb speed to close the throttles, shut off the battery and generator switches, shutoff the fuel selectors, and continue straight ahead, turning to avoid obstacles if necessary.

3. If there was insufficient runway remaining and the airplane had reached best angle of climb speed for single-engine and was airborne to "IMMEDIATELY CLEANUP THE AIRPLANE (RETRACT THE LANDING GEAR, FEATHER THE WINDMILLING PROPELLER) AND FOLLOW NORMAL SINGLE –ENGINE PROCEDURE

Additionally, the flight handbook also contained a 'NOTE" that stated, "With the airplane clean you can climb. With gear down, propeller windmilling and cowl flaps open, you will not be able to maintain altitude."

ORGANIZATIONAL AND MANAGEMENT INFORMATION

According to the FAA, if an operator provides air transportation of persons or property for

compensation or hire, the operator must hold an air carrier certificate and appropriate operations specifications issued under Title 14 Part 119 of the CFRs. A requirement for an air carrier certificate holder conducting operations under Part 135 is to maintain control and authority over the initiation, continuity, conduct, and termination of its Part 135 flights. Among other things, the air carrier must have knowledge of the flights beforehand, have legal possession of the aircraft and have all required records to show how it determined legal aircraft and legal crew before the flight. The Title 14 CFRs makes it incumbent on the Part 135 charter operator to maintain that control, referred to as "operational control". A carrier properly exercising operational control must be able to show, prior to flight, that the crew is qualified (e.g., is trained, has a current medical certificate and meets duty, flight and rest provisions) and the aircraft is airworthy.

According to the operator's FAA approved operations specifications, the pilot was also the owner of Aircap Management Inc., which did business as Island Air Service. He was also the president, director of operations, and chief pilot for the on-demand, 14 CFR Part 135 passenger and cargo operation, and had the authority to exercise operational control.

The mechanic was also listed in the FAA approved operations specifications as the director of maintenance and was responsible for administering the operator's maintenance program.

History of Flight

Initial climb	Loss of engine power (partial) Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Airline Transport; Flight Instructor	**Age:**	64, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane Single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With Waivers/Limitations	**Last Medical Exam:**	04/25/2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	05/04/2010
Flight Time:	(Estimated) 6400 hours (Total, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	BEECH	**Registration:**	N18R
Model/Series:	E18S	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Normal	**Serial Number:**	BA-312
Landing Gear Type:	Retractable - Tailwheel	**Seats:**	
Date/Type of Last Inspection:	06/30/2010, Annual	**Certified Max Gross Wt.:**	9700 lbs
Time Since Last Inspection:		**Engines:**	2 Reciprocating
Airframe Total Time:	13221 Hours	**Engine Manufacturer:**	P&W
ELT:	Installed, not activated	**Engine Model/Series:**	R-985-14B
Registered Owner:	AIRCAP MANAGEMENT CO INC	**Rated Power:**	450 hp
Operator:	AIRCAP MANAGEMENT CO INC	**Air Carrier Operating Certificate:**	On-demand Air Taxi (135)
Operator Does Business As:	Island Air Service	**Operator Designator Code:**	19XA

Meteorological Information and Flight Plan

Observation Facility, Elevation:	OPF, 8 ft msl	**Observation Time:**	0753 EDT
Distance from Accident Site:	1 Nautical Miles	**Condition of Light:**	Day
Direction from Accident Site:	225°	**Conditions at Accident Site:**	Visual Conditions
Lowest Cloud Condition:	Few / 2800 ft agl	**Temperature/Dew Point:**	26°C / 20°C
Lowest Ceiling:	None	**Visibility**	10 Miles
Wind Speed/Gusts, Direction:	12 knots, 110°	**Visibility (RVR):**	
Altimeter Setting:	30.08 inches Hg	**Visibility (RVV):**	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Opa Locka, FL (OPF)	**Type of Flight Plan Filed:**	VFR
Destination:	Marsh Harbour (MYAM)	**Type of Clearance:**	VFR
Departure Time:	0809 EDT	**Type of Airspace:**	

Airport Information

Airport:	Opa-Locka Executive Airport (OPF)	**Runway Surface Type:**	Asphalt
Airport Elevation:	8 ft	**Runway Surface Condition:**	Dry
Runway Used:	09L	**IFR Approach:**	None
Runway Length/Width:	8002 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:	N/A	**Aircraft Fire:**	On-Ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal		

Administrative Information

Investigator In Charge (IIC):	Todd G Gunther	**Adopted Date:**	06/28/2012
Additional Participating Persons:	Felix B Molina; FAA/FSDO; Miramar, FL		
Publish Date:	08/12/2013		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=79001		

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