		NTSB ID: SEA08FA071		Aircraft Registration Number: N698DM	
		Occurrence Date: 02/07/2008		Most Critical Injury: Minor	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Hilo		State HI	Zip Code 96720	Local Time 1435	Time Zone HST
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series 369E		Type of Aircraft Helicopter	
Revenue Sightseeing Flight: Yes			Air Medical Transport Flight: No		
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>*** Note: NTSB investigators either traveled in support of this investigation or conducted a significant amount of investigative work without any travel, and used data obtained from various sources to prepare this aircraft accident report. ***</p> <p>HISTORY OF FLIGHT</p> <p>On February 7, 2008, at 1435 Hawaiian standard time, a McDonnell Douglas 369E helicopter, N698DM, sustained substantial damage during a forced landing, subsequent to a loss of engine power shortly after departure from Hilo International Airport, Hilo, Hawaii. The helicopter was registered to K&S Helicopters and operated by Tropical Helicopters of Kailua Kona, Hawaii. The on-demand air tour sightseeing flight was operated under the provisions of Title 14, Code of Federal Regulations Part 135, when the accident occurred. The commercial pilot and four passengers aboard the helicopter received minor injuries. Visual meteorological conditions prevailed, and company visual flight rules (VFR) flight-following procedures were in effect. The round-robin sightseeing flight originated about 1420 from Hilo. The helicopter sustained substantial damage to the fuselage during the landing sequence.</p> <p>During a telephone conversation with the National Transportation Safety Board investigator-in-charge (IIC), and subsequent written report, a representative from the operator stated that approximately 5 minutes after takeoff, at an estimated altitude between 1,800 and 2,000 feet mean sea level (MSL) the pilot activated the fuel start pump (boost pump) and initiated a 180-degree turn back to the airport after observing the illumination of the fuel bypass caution light. The pilot reported that he heard 2-3 low pitched "poofing sounds" during the turn with simultaneous "yawing of the aircraft." The pilot reduced power, entered an autorotation and initiated an off-airport landing. He reported that during the final stages of the autorotation, during the flare, the engine "flamed out." The helicopter touched down in tall dense grass, settled, and rolled over onto its left side.</p> <p>The helicopter sustained structural damage to the fuselage, tail assembly and rotor head.</p> <p>AIRCRAFT INFORMATION</p> <p>The accident helicopter, a McDonnell Douglas (MD) 369E, was manufactured in 1989. The single-engine helicopter was powered by an Allison/Rolls-Royce turbo shaft engine rated at 420 horsepower.</p> <p>The helicopter was maintained in accordance with the manufacture's airworthiness inspection program. Review of the maintenance records revealed that the helicopter's most recent airframe and engine inspection (100-hour) was completed on January 19, 2008, at 9,118 total flight hours, engine and airframe (66 flight hours prior to the accident).</p> <p>No open maintenance discrepancies were noted prior to the accident flight.</p>					
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National Transportation Safety Board

FACTUAL REPORT

AVIATION

NTSB ID: SEA08FA071

Occurrence Date: 02/07/2008

Occurrence Type: Accident

Narrative (Continued)

WRECKAGE AND IMPACT INFORMATION

The helicopter came to rest on flat open terrain covered by dense grass approximately six miles west of the departure airport. The helicopter was intact and all major components were identified at the accident site prior to recovery efforts. The tail boom, tail rotor gearbox and tail rotor assembly were in place and remained attached to the airframe. The main rotor system was in place, however, two of the four main rotor blades were separated from the main rotor head.

Federal Aviation Administration (FAA) Inspectors reported that fuel leak was observed during the on site inspection of the helicopter. Examination of the engine assembly revealed that the fuel leak originated from the fuel filter pressure differential switch. Inspectors reported that differential switch was in place and the associated fuel lines, bushing and adapter fitting were intact and appeared to be undamaged.

Subsequent to the preliminary inspection, the engine was removed from the airframe and shipped to the manufacturer for additional examination and testing.

TESTS AND RESEARCH

Visual inspection of the engine assembly was conducted at the manufacturer's facility by representatives from NTSB, Rolls-Royce and Boeing. During the inspection it was noted that one of the fuel filter pressure differential switch set screws, and associated safety wire, was missing. The two remaining screws were in place. One of the screws was fixed, the other finger tight. The corresponding safety wire was attached to the remaining set screws; however, the distal end of the safety wire leading to the missing set screw was severed.

At the completion of the inspection the engine was secured in a production test cell and evaluated. During the initial test, the cell fuel delivery system was turned on and the engine was motored to approximately 16 percent N1 (compressor speed). A considerable fuel leak, which originated from the fuel filter pressure differential switch, was noted and the test was terminated.

The original fuel filter pressure differential switch was removed and replaced with an exemplar switch. A second start sequence was initiated. The engine started and ran continuously without interruption throughout a multitude of steady state and transient power settings, to include rapid accelerations and decelerations. All engine parameters were found to be within factory specifications throughout the testing.


Engine testing was accomplished utilizing both the test cell fuel delivery system and engine driven fuel pump.

ADDITIONAL DATA/INFORMATION

The fuel filter pressure differential switch, part number 369H8144-3, consists of, in part, of a diaphragm enclosed by a two-piece housing. The housing is secured by the three above mentioned set screws.

The accident helicopter utilizes a non-pressure boosted fuel system for normal operation. The engine fuel pump generates a vacuum at its inlet to lift the fuel from the tank to the engine fuel delivery system. According to a representative from the engine manufacturer, the MD369E utilizes a non-pressure boosted fuel system for normal operation. The engine fuel pump generates a vacuum at its inlet to lift the fuel from the tank and overcome line pressure drops. In field operation a supply line air leak may create a non-homogeneous two-phase flow condition of fuel and air creating a fluctuating output supply to the metering unit.

Maintenance records provided by the operator indicated that the helicopter's fuel system components were inspected during the 100-hour inspection interval completed on January 19.


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Narrative (Continued)

The maintenance "check sheet" corresponding with the inspection indicated that the engine's fuel system components, to include fuel lines and connections, were inspected for leaks or damage, and no anomalies were noted.

The helicopter maintenance manual CSP-HMI-2, Basic Handbook of Maintenance Instructions, Servicing and Maintenance, Chapter 28-00-00, Fuel System, has multiple warnings that "Air in the fuel system will cause a power reduction or flameout."

Updated on Jan 29 2009 5:56PM

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: SEA08FA071				
		Occurrence Date: 02/07/2008				
		Occurrence Type: Accident				
Landing Facility/Approach Information						
Airport Name Hilo		Airport ID: PHTO	Airport Elevation Ft. MSL	Runway Used N/A	Runway Length	Runway Width
Runway Surface Type:						
Runway Surface Condition:						
Approach/Arrival Flown: NONE						
VFR Approach/Landing: Forced Landing						
Aircraft Information						
Aircraft Manufacturer MCDONNELL DOUGLAS		Model/Series 369E		Serial Number 348E		
Airworthiness Certificate(s): Normal						
Landing Gear Type: Skid;						
Amateur Built Acft? No		Number of Seats: 5	Certified Max Gross Wt. 3000 LBS		Number of Engines: 1	
Engine Type: Turbo Shaft		Engine Manufacturer: Rolls-Royce Allison		Model/Series: 250-C20B	Rated Power: 420 HP	
- Aircraft Inspection Information						
Type of Last Inspection 100 Hour		Date of Last Inspection 01/2008	Time Since Last Inspection 66 Hours		Airframe Total Time 9118 Hours	
- Emergency Locator Transmitter (ELT) Information						
ELT Installed?/Type Yes /		ELT Operated? No	ELT Aided in Locating Accident Site? No			
Owner/Operator Information						
Registered Aircraft Owner K&S Helicopters		Street Address				
		City Kailua Kona		State HI	Zip Code 96745	
Operator of Aircraft Tropical Helicopters		Street Address				
		City Kailua Kona		State HI	Zip Code 96745	
Operator Does Business As:			Operator Designator Code: K2DA			
- Type of U.S. Certificate(s) Held:						
Air Carrier Operating Certificate(s): On-demand Air Taxi						
Operating Certificate:			Operator Certificate:			
Regulation Flight Conducted Under: Part 135: Air Taxi & Commuter						
Type of Flight Operation Conducted: Non-scheduled; Domestic; Passenger Only						
FACTUAL REPORT - AVIATION						

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA08FA071
	Occurrence Date: 02/07/2008
	Occurrence Type: Accident

First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 65
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Sex: M	Seat Occupied: Left	Occupational Pilot? Yes	Certificate Number: On File
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Certificate(s): Commercial

Airplane Rating(s): Multi-engine Land; Single-engine Land; Single-engine Sea

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): None

Instructor Rating(s): None

Current Biennial Flight Review? 12/2007

Medical Cert.: Class 2	Medical Cert. Status: With Waivers/Limitations	Date of Last Medical Exam: 10/2007
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	19800	850	1000	250	1200	200	30	18500	40	
Pilot In Command(PIC)	19500	850	975	240	1185	200	30	18250	36	
Instructor										
Instruction Received										
Last 90 Days	65									
Last 30 Days	38	38					38			
Last 24 Hours	2	2					2			

Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? No
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Flight Plan/Itinerary

Type of Flight Plan Filed: Company VFR

Departure Point HILO	State HI	Airport Identifier PHTO	Departure Time 1425	Time Zone HST
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Destination Local Flight	State HI	Airport Identifier PHTO	
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Type of Clearance: Traffic Advisory

Type of Airspace:

Weather Information

Source of Wx Information:

Flight Service Station; National Weather Service

 <p>National Transportation Safety Board FACTUAL REPORT AVIATION</p>	NTSB ID: SEA08FA071
	Occurrence Date: 02/07/2008
	Occurrence Type: Accident

Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation Ft. MSL	WOF Distance From Accident Site NM	Direction From Accident Site Deg. Mag.
Sky/Lowest Cloud Condition: Scattered			1500 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		2000 Ft. AGL	Visibility: 6	SM	Altimeter: "Hg
Temperature: 20 °C	Dew Point: °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 140	Wind Speed: 12	Wind Gusts:			
Visibility (RVR): Ft.	Visibility (RVV): SM				
Precip and/or Obscuration: No Obscuration; No Precipitation					

Accident Information		
Aircraft Damage: Substantial	Aircraft Fire: None	Aircraft Explosion: None

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot			1		1
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers			4		4
- TOTAL ABOARD -			5		5
Other Ground					
- GRAND TOTAL -			5		5

National Transportation Safety Board

FACTUAL REPORT

AVIATION



NTSB ID: SEA08FA071

Occurrence Date: 02/07/2008

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

Dennis J. Hogenson

Additional Persons Participating in This Accident/Incident Investigation:

Edward Valdez
Honolulu FSDO
Honolulu, HI

Jeff Edwards
Rolls-Royce
Indianapolis, IN

Adrian Booth
The Boeing Company
Mesa, AZ