



National Transportation Safety Board Aviation Accident Final Report

Location:	LENA, Louisiana	Accident Number:	FTW97FA121
Date & Time:	March 14, 1997, 01:45 Local	Registration:	N7161J
Aircraft:	MBB BO-105S	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

During a dark night flight from Shreveport, Louisiana, to Lafayette, Louisiana, via Alexandria, Louisiana, the helicopter descended to 500 feet MSL due to weather, and was following Interstate 49 south over the northbound lanes. The pilot slowed the helicopter to 70 knots keeping pace with the traffic. The medical crewmember remembered 'feeling a shudder, like the shudder as the helicopter decelerates through effective translational lift.' He heard the pilot say an expletive and felt the helicopter begin to turn left. He saw sparks overhead and felt plexi glass hit him. Subsequently, the helicopter impacted the ground. During this sequence he lost visual orientation of the helicopter's position in relation to the ground. According to the company's Operations Manual, during nighttime hours, the air ambulance cross country VFR minimum ceiling is 1,000 feet and the minimum visibility is 3 miles. Any flight outside the local flying area is considered a cross-country operation. The medical crewmember reported that the ceiling was about 550 to 600 feet, and the visibility was approximately 2 miles. Examination of the helicopter did not reveal any structural or mechanical anomalies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's continued VFR flight into instrument meteorological conditions, and his subsequent loss of aircraft control due to spatial disorientation. Factors were the pilot not following company procedures and directives, the low ceiling, and the dark night light condition.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: MANEUVERING

Findings

1. (F) WEATHER CONDITION - LOW CEILING

Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: MANEUVERING

Findings

2. (F) LIGHT CONDITION - DARK NIGHT

3. (F) PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND

4. (C) VFR FLIGHT INTO IMC - CONTINUED - PILOT IN COMMAND

5. (C) SPATIAL DISORIENTATION - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On March 14, 1997, approximately 0145 central standard time, a MBB BO-105S helicopter, N7161J, registered to Deutsche Financial Services Holding Corporation, and operated by Petroleum Helicopters, Inc. (PHI), under contract to Acadian Air Med Services as a Title 14 CFR Part 91 positioning flight, was destroyed following a loss of control near Lena, Louisiana. Instrument meteorological conditions prevailed, and a company VFR flight plan was filed for the dark night cross country flight. The instrument rated commercial pilot was fatally injured, and the medical crewmember was seriously injured. The dark early morning flight originated from Shreveport, Louisiana, at 0102, about 42 minutes prior to the accident, and was en route to Lafayette, Louisiana, via Alexandria, Louisiana.

The medical crewmember reported the following information in an interview conducted by the investigator-in-charge. He was handling flight following with company dispatch while the pilot was talking with ATC. They had descended to 500 feet MSL due to weather, and were following Interstate 49 south over the northbound lanes. The pilot had slowed the helicopter to 70 knots and was keeping pace with the traffic. He remembered "feeling a shudder, like the shudder as the helicopter decelerates through effective translational lift." He heard the pilot say an expletive and felt the helicopter begin to turn left. He saw sparks overhead and felt plexi glass hit him. Subsequently, the helicopter impacted the ground. During this sequence he lost visual orientation of the helicopter's position in relation to the ground. After the helicopter came to a stop he jumped out and "ran into the darkness," about 30 to 40 yards. "As I turned to look behind me I realized that it was so dark that I could not see the aircraft anymore." It was not until the first car passed by that "I realized we were close to the interstate."

Witnesses reported to local law enforcement officials that they were in their car traveling south along Interstate 49 when they saw the helicopter in front of them slow down. As they passed the helicopter, they could clearly see its registration number. As they continued to watch the helicopter through the back window and rear view mirrors, they observed sparks and then saw the helicopter impact the ground. They crossed over the grass median, and as they approached the helicopter, they observed the medical crewmember walking around.

Another witness reported the following information to the investigator-in-charge. He was driving southbound on Interstate 49, north of Alexandria, Louisiana, when he observed a helicopter in front of him coming from the northwest and traveling southeast just above the trees. The helicopter began following the highway southbound at a slow speed. He was traveling at a speed of 75 MPH and was catching up to the helicopter. He started to slow down because he thought the helicopter was going to land. He saw a flash and then the "helicopter crashed." He originally thought that the helicopter crashed on the southbound lane; however, when he arrived at the crash site it was on the northbound side of the highway. He stated that it was a very dark night and the visibility "appeared good."

PERSONNEL INFORMATION

The instrument rated commercial pilot had been employed by PHI since July 30, 1984. The pilot had accumulated a total of 7,179 flight hours, of which 3,598 hours were in the BO-105 helicopter. He had also accumulated a total of 437 hours at night, of which 5 hours were in the last 30 days. On August 11, 1985, the pilot completed transition training in the BO-105 helicopter, and demonstrated proficiency in accordance with FAR 135.293 and FAR 135.299. On February 11, 1988, he successfully completed Helicopter Emergency Medical Service Pilot Training in accordance with the Petroleum Helicopters, Inc., training manual. On September 16, 1996, he completed VFR recurrent training, which included basic instrument proficiency, and demonstrated competency in the BO-105 helicopter in accordance with FAR 135.293 and FAR 135.299.

AIRCRAFT INFORMATION

The air medical helicopter had a total airframe time of 3,570 hours and 25 minutes at the time of the accident. The aircraft was equipped for night operations; however, it was not certified for flight into instrument meteorological conditions, nor was it equipped with an autopilot. A review of the airframe and engine records did not reveal any anomalies or uncorrected maintenance defects. An estimate of the weight of the helicopter at the time of the accident placed it within weight and balance limits.

METEOROLOGICAL INFORMATION

Federal Aviation Administration (FAA) records revealed the pilot of N7161J called DeRidder AFSS by telephone at 0030, and received a weather briefing for a VFR flight from Shreveport, Louisiana, to Lafayette, Louisiana via Alexandria, Louisiana. The pilot was advised VFR flight was not recommended. He was briefed that instrument meteorological conditions prevailed throughout the area and that convective sigmet 7C was in effect for Louisiana and Alabama from 30 miles north northeast of Mobile, Alabama, to 30 miles north northeast of Alexandria, Louisiana, for a line of thunderstorms 20 miles wide moving east at 30 knots. He was also briefed on a stationary cold front located mid way between Shreveport and Alexandria. The weather for Alexandria at the time of the briefing was a ceiling of 700 feet broken, visibility of 7 miles with mist. Fort Polk weather was 300 feet overcast, visibility of 4 miles with mist.

The medical crewmember reported to the investigator-in-charge that the ceiling while flying over Interstate 49 was about 550 to 600 feet, and the visibility was approximately 2 miles.

COMMUNICATION

The pilot established radio contact with Polk approach control at 0132. At 0133, approach control advised the pilot that Alexandria was reporting a broken cloud layer at 700 feet. At 0136, the pilot informed Polk approach that he intended to request a Special VFR clearance through the Alexandria International Airport's Class D airspace upon arrival at Alexandria. At 0138, Polk approach observed on radar that N7161J was descending and asked the pilot to what altitude he would be descending. The pilot replied he was descending to 500 feet. At 0142, Polk approach attempted to issue a Special VFR clearance to the pilot; however, the pilot did not respond. There were no further radio communications from the pilot. Radar contact was lost with the helicopter at 0144, approximately 10 miles northwest of the Alexandria

International Airport at an altitude of 200 feet. The elevation at the Alexandria Airport is 89 feet.

The medical crewmember using the call sign "Air Med 1" established radio contact with Acadian Ambulance Service, Inc. (AASI) dispatch center for flight following at 0112. At 0114, Air Med 1 and the AASI dispatcher had a discussion on the expected weather after passing Alexandria. At 0117, Air Med 1 requested the weather at Lafayette, and the dispatcher contacted Air Med 4 (Alexandria based) for the current weather at Alexandria. At 0118, Air Med 4 reported to the dispatcher that Alexandria was currently reporting a ceiling of 600 feet, and the visibility was 6 miles; however, he advised the weather was lower than reported. At 0119, the dispatcher reported to Air Med 1 that Alexandria and most of Rapides had a ceiling of 500 to 700 feet and the visibility was 5 miles. At 0139, Air Med 1 reported to the AASI dispatch center that they were 10 minutes out of Alexandria, and they were under 500 feet following Interstate 49. The dispatcher asked Air Med 1 if they were planning on staying at Alexandria, and Air Med 1 advised that they would make that decision when they got a little closer. There were no further radio communications from Air Med 1.

WRECKAGE AND IMPACT INFORMATION

The aircraft wreckage was located on the east side of the northbound lanes of Interstate 49, between mile markers 104 and 105, and vehicle traffic was light during the early morning hours. The aircraft came to rest next to the initial ground scar on a measured magnetic heading of 105 degrees. There was a curved ground scars 10 feet in front of and perpendicular to the aircraft wreckage. Also to the right of the ground scars were curved scars on the concrete roadway. See the enclosed wreckage diagram.

The roof of the cabin was separated from the fuselage, and the engine deck with both engines and tailboom attached were also separated as a unit. The skids were shifted left along the cross tube mounting, with a slight bend on the right side. There was upward crushing of the right forward and aft cross tube mounts. Control continuity was established to all flight controls.

The main rotor head was intact and all four main rotor blades (MRB) were sheared off at the blade fittings near the root of the blades. All four pitch change rods were intact, and there was continuity and freedom of movement of the rotor and controls. The yellow MRB had some leading edge damage. The green MRB had abrasions to the leading edge and top side, and the cuff was separated. The blue MRB was broken mid span, and was found in a tree to the left rear of the wreckage. The red MRB had very little damage and was found to the left front of the wreckage.

The tailboom was bent down at the ring flange. The vertical fin was separated forward and to the left, and the tail skid was bent left. The tail rotor gearbox was intact and moved freely. The short tail rotor driveshaft was bent, and the long tail rotor driveshaft was intact and it displayed rotational scars. The driveshaft between the intermediate and tail rotor gearbox was attached to the tail rotor gearbox; the coupling on the tail rotor gearbox side was distorted and the coupling on the intermediate gearbox side was sheared. See the enclosed American Eurocopter report for further details.

The engine mounts for both engines were not damaged. The N1 gas producer and N2 power turbine on each engine rotated free and smooth. The N1 was continuous to the starter generator, and the N2 was continuous to the output shaft for each engine. Both engine's compressors exhibited foreign object damage to at least the first stage blades. Turbine blade damage was opposite to the direction of compressor rotation. According to the Allison representative, this is indicative of compressor rotation when the damage occurred. No anomalies were found that could have prevented normal operation. See the enclosed Allison Engine report for further details.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed by George M. McCormick, II, M.D., Ph.D., of the Forensic Pathologists, Inc. of Bossier City, Louisiana. Toxicology findings were negative.

TESTS AND RESEARCH

The tandem hydraulic unit was tested on March 16, 1997, at the PHI maintenance facility under the direction and supervision of the investigator-in-charge. The unit was found selected to the number one hydraulic pump. Both hydraulic pumps were functionally tested under a load, and there were no discrepancies noted. The flow check for the number one hydraulic pump was 1.7 gallons per minute (GPM), and for the number two hydraulic pump it was 1.4 GPM.

The attitude indicator and altimeter were removed and examined at the direction of the investigator-in-charge. Inspection of the attitude indicator revealed both the outer and inner gimbals were broken apart. Visual inspection of the altimeter revealed the rear brackets and both sides were crushed, which prevented the dial from turning internally. Also the ten thousands needle was loose on its shaft. Due to this impact damage, both the attitude indicator and altimeter could not be functionally tested.

According to PHI's Operations Manual, during nighttime hours, the air ambulance cross country VFR minimums are 1,000 foot ceiling and visibility of 3 miles. Any flight outside a local flying area is considered a cross-country operation. The local flying area is described as an area within a 25 nautical mile radius from the base of operations; except for those areas specifically described in Volume 1 of their General Operations Manual.

The U.S. Army's manual entitled Aeromedical Training For Flight Personnel, FM 1-301, Chapter 8, states in part:

regardless of their flight time experience, all aircrew members are subject to disorientation. The human body is structured to perceive changes in movement on land in relation to the center of the earth. In an aircraft, the human sensory systems-the visual system, the vestibular system, and the proprioceptive system-may give the brain erroneous orientation information. This information can cause sensory illusions, which may lead to spatial disorientation.

In Chapter 8-3, Visual Illusions, the manual indicates that the "relative motion" illusion is

often encountered during formation flight when pilots see the movement of another aircraft and interpret it as their own motion. It also indicates that the "depth perception" illusion gives the pilot the illusion that he is higher than he actually is, and flight into an area where visibility is restricted by haze, smoke, or fog may produce this illusion.

ADDITIONAL DATA

The helicopter wreckage was released to the owner.

Pilot Information

Certificate:	Commercial	Age:	47, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Right
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	June 12, 1996
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	7179 hours (Total, all aircraft), 3958 hours (Total, this make and model), 76 hours (Last 90 days, all aircraft), 26 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MBB	Registration:	N7161J
Model/Series:	BO-105S BO-105S	Aircraft Category:	Helicopter
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	S 834
Landing Gear Type:	Skid	Seats:	4
Date/Type of Last Inspection:	February 21, 1997 AAIP	Certified Max Gross Wt.:	5512 lbs
Time Since Last Inspection:	24 Hrs	Engines:	2 Turbo shaft
Airframe Total Time:	3570 Hrs	Engine Manufacturer:	Allison
ELT:	Installed, not activated	Engine Model/Series:	250-C20B
Registered Owner:		Rated Power:	425 Horsepower
Operator:		Operating Certificate(s) Held:	On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Night/dark
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:	Unknown	Visibility	2 miles
Lowest Ceiling:	Overcast / 550 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:	0°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SHREVEPORT , LA (HLUS)	Type of Flight Plan Filed:	Company VFR
Destination:	LAFAYETTE , LA (LFT)	Type of Clearance:	VFR on top
Departure Time:	01:01 Local	Type of Airspace:	Class G

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	

Wreckage and Impact Information

Crew Injuries:	1 Fatal, 1 Serious	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Fatal, 1 Serious	Latitude, Longitude:	31.460443,-92.770942(est)

Administrative Information

Investigator In Charge (IIC): Wigington, Douglas

Additional Participating Persons: JOSEPH D SMITH; BATON ROUGE , LA
DEL LIVINGSTON; GRAND PRAIRIE , TX
JOHN F SWIFT; INDIANAPOLIS , IN
MICHAEL C HURST; LAFAYETTE , LA

Original Publish Date: January 7, 1998

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=20024>

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).