
		NTSB ID: ATL94FA179		Aircraft Registration Number: N83112	
		Occurrence Date: 09/28/1994		Most Critical Injury: Fatal	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place KNIGHTDALE		State NC	Zip Code 27545	Local Time 0947	Time Zone EDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility: 2			
Aircraft Information Summary					
Aircraft Manufacturer ROBINSON		Model/Series R-22B /R-22B		Type of Aircraft Helicopter	
Revenue Sightseeing Flight: No			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 September 28, 1994, at 0947 eastern daylight time, a Robinson R-22B helicopter, N83112, collided with the ground after the main rotor system struck the tail boom of the helicopter near Knightdale, North Carolina. The business flight operated in accordance with 14 CFR Part 91, with no flight plan filed. Visual weather conditions prevailed at the time and location of the accident. The helicopter was destroyed during the inflight breakup sequence and a post impact fire; the pilot was fatally injured. The flight departed Raleigh East Airport in Knightdale, North Carolina, at 0945 hours.</p> <p>According to the President of Raleigh Helicopters, the pilot arrived at Raleigh East Airport at 0800. There are no records of the pilot receiving a weather briefing. According to witnesses at the airport, the airport fogged in when the pilot arrived. The flight was delayed until visual weather conditions prevailed. According to witnesses at the airport, the takeoff and initial climbout were normal, but a minute into the departure, they heard the pilot of N83112 transmit in an excited voice, "Hey! I've got a..". No other radio transmissions were heard.</p> <p>Eyewitnesses, located 1/2 mile east of the accident site, recalled seeing the helicopter as it flew west at an altitude between 200 and 300 feet above the ground. They stated that the helicopter appeared to "fishtail", and a sputtering sound was also heard coming from the helicopter. The witnesses continued to observe the helicopter until it disappeared into the 80 foot tall trees; seconds later, a fireball was seen rising from the area where the helicopter was last seen.</p> <p>PERSONNEL INFORMATION</p> <p>Information on the pilot is included in this report at the data field labeled "First Pilot Information." The 35 year old, commercial rated pilot was certificated to fly single and multiengine airplanes, and helicopters; he was also a certified flight instructor (CFI) in helicopters. According to the President of Raleigh Helicopters, the pilot was hired as a part-time flight instructor/pilot on April 16, 1994. Under this agreement, the pilot flew as an independent contractor and received compensation for flight instruction given to students from Raleigh Helicopters; the pilot was seeking additional employment when the accident occurred.</p> <p>A review of the pilot's flight logs revealed that, on July 23, 1990, he received initial helicopter flight training from South Carolina Helicopters, Saluda, South Carolina, in the Hughes 269A helicopter. On July 31, 1990, the pilot received a private helicopter rating.</p>					
FACTUAL REPORT - AVIATION					

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Narrative (Continued)

The flight log review also showed that the pilot completed as many as four flights in one day and he flew a total of 31.4 hours within seven days, to complete helicopter rating requirements.

Subsequent to his initial helicopter qualification, the pilot flew several hours in different aircraft, and received an initial checkout in the Robinson R-22 helicopter from Raleigh Helicopters, Knightdale, North Carolina on December 14, 1991. Records indicated the pilot completed the Robinson Helicopter Company (RHC) Pilot Safety Checkout in accordance with RHC R-22 Flight Training Guide (see attached maneuvers listed in the RHC Pilot Safety Checkout Worksheet).

Raleigh Helicopters flight training program is outlined in the flight training manual. The flight training manual includes the following areas:

- | | | |
|-----------------------------|-----------------------------|--|
| 1. Flight Training Syllabus | 2. Ground Training Syllabus | 3. R-22 Maneuver |
| Guide | 4. School Safety Procedures | 5. RHC Safety Notices (RSN-1 through 29) |

The operator also reported that implementation of the flight training guide varied due to the part-time status of many students. Often part-time students would have extended breaks in their training program and require additional review periods to restore student proficiency before continuing the flight training program.

AIRCRAFT INFORMATION

Information on the helicopter is contained in this report at the data field labeled "Aircraft Information." N83112 arrived in Knightdale as a sales aircraft. On July 27, 1994, Triangle Helicopter Leasing, LLC, purchased N83112 from the Robinson Helicopter Company and subsequently leased the helicopter to Raleigh Helicopters (see attached N83112 purchase history). A review of the aircraft maintenance records failed to disclose any carryover or delayed maintenance actions for the powertrain or flight control systems.

METEOROLOGICAL INFORMATION


Visual weather conditions prevailed at the accident site at the time of the accident. Weather information is contained in this report at the data field labeled "Weather Information." Witnesses at the airport and within 1/2 mile of the accident site confirmed that the fog layer had dissipated when the accident occurred. Approximately 18 miles west of the accident site, instrument weather conditions were reported at the Raleigh-Durham International Airport, at the time of the accident.

WRECKAGE AND IMPACT INFORMATION

The main wreckage and accident site were located 1 1/2 miles west of Raleigh East Airport and north of a single set of Norfolk and Southern Railroad tracks. Examination of the accident site revealed that wreckage debris from the helicopter was scattered over an area 800 feet long and 100 feet wide. The wreckage distribution path was orientated on a westerly heading (see attached wreckage diagram in Airworthiness Group Chairman's Factual Report).

A general examination of the accident site revealed that the main rotor assembly and the aft five foot section of the tail cone, with tail rotor assembly attached, were located within 125 feet of the main wreckage. The tail rotor drive shaft was 600 feet west of the main wreckage. All helicopter flight control components and accessories were recovered for examination. The cockpit and fuselage were fire damaged. Despite the fire damage, flight and powertrain control components were located in the wreckage debris. Plexiglass debris from the windshield and skylight was recovered from the wreckage path 200 feet east of the main wreckage.

During the reconstructive phase, flight control rod ends were located and traced to their respective positions (see attached Airframe and Systems Damage Charts).

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Narrative (Continued)

The tail rotor drive shaft and a section of the tail cone were not recovered initially, but a month after the accident, a local family found the drive shaft in their backyard; the tail rotor drive shaft was 600 feet west of the accident site. The recovered section of the tail cone was located 200 feet east of the main wreckage.

The fire damaged fuselage section of the airframe rested on the left side orientated on a northerly magnetic heading. The post impact fire destroyed the cockpit section of the airframe and the engine compartment sustained extensive thermal damage. Fire also melted part of the right skid assembly and portions of the flight control tubes. Although the transmission and mast assemblies were within the fire pattern, they sustained little heat distress.

Further examination of the accident site disclosed that the main rotor assembly separated from the transmission mast just above the swashplate assembly. The main rotor assembly, with both blades attached, was located 31 feet north of the main wreckage. Examination of main rotor blade S/N 8262C showed that the blade was bent gradually upward over the entire length except for a small area on the inboard side of a fracture on the leading edge spar. This fracture was 7 feet 3 inches from the tip of main rotor blade S/N 8262C. All fractures in the blade skin and spar materials were typical of overstress separation. Main rotor blade S/N 8246C also exhibited upward bending over the entire length of the blade surface. Further examination of the main rotor blade, S/N 8246C, revealed red and gray paint smears on the upper skin and along the leading edge (see attached Airworthiness Group Chairman's Report). The paint smears were nine feet two inches from the center of the main rotor hub.

An additional examination of the main rotor blades included the inspection of the bonding between the skin and the honeycomb structure. This examination checked samples from the undamaged portion of the rotor blades. The examination showed no evidence of adhesive separations, or poor workmanship.

The main rotor head separated from the mast assembly just above the swashplate assembly. Examination of the fracture face showed that the failure occurred in overload. There was buckling damage near the fracture face on the mast where the spindle from both blades made contact. The tusk for the spindle from blade S/N 8262C was broken in overstress shear; the tusk from blade S/N 8246C remained attached to the spindle.


The paint smears on the main rotor blades matched the paint scheme on the tail boom and the tail rotor pitch change drive tube. The gray tail rotor pitch change control tube was located adjacent to the railroad bed north of the track near the main wreckage. The fractured end of the tail rotor pitch change control tube was diagonally flattened from the normally round shape.

As previously stated, the tail rotor drive shaft was located 600 feet west of the main wreckage. Examination of the assembly disclosed that a similar diagonal flattening of the gray round shaft occurred at the mid-span point. The shaft was bent at the mid-span point in excess of 90 degrees from its normally straight condition. The recovered section of the tail cone exhibited diagonal slash marks similar to the ones observed on the tail rotor drive shaft and the tail rotor pitch control rod. Examination of the recovered plexiglass debris disclosed near vertical scrape marks on several pieces. The reconstructive process of the plexiglass material determined that the marked pieces were normally installed at the left upper corner of the left seat side of the helicopter.

The subsequent examination of the engine assembly failed to disclose a mechanical malfunction. The engine assembly remained attached to the airframe, and received smoke and fire damage.

MEDICAL AND PATHOLOGICAL INFORMATION

The postmortem examination on the pilot was performed by Dr. Dewey H. Pate, at the North Carolina Office of The Chief Medical Examiner, Chapel Hill, North Carolina. The cause of death was reported as multiple trauma secondary to the accident. The toxicology examination was negative for drugs and alcohol.

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ADDITIONAL INFORMATION

Recovered Airport Surveillance Radar (SAR), Raleigh International Airport (RDU), data disclosed that the helicopter had made a right-hand turn with the ground track changing from a easterly heading to a westerly heading. Ground speed information was not determined during the 23 seconds of radar coverage. The helicopter maneuvered within an area less than 1/5 of a mile square, 18 miles east of RDU at 700 feet mean sea level. N83112 changed flight directions five times before radar contact was lost at 0947:00.440.


A review of Raleigh Helicopters' operating procedures revealed that Federal Aviation Administration's (FAA) recommendations from General Aviation Airworthiness Alert AC No. 43-16, dated July 22, 1994, were not incorporated into their normal operation. According to Raleigh Helicopters officials, this alert was never received, and they were not aware of the recommendations (see attached General Aviation Airworthiness Alert AC NO. 43-16). The Special Issue, Robinson Model R-22 and R-44 Helicopters-Recent Accidents provided seven recommendations for R-22 and R-44 operations. The seven recommendations stressed operational limitations on both helicopters. These recommendations were generated as a result of several R-22 and R-44 aircraft accident investigations.


According to the background data, the Special Airworthiness Alert states that many of the R-22 accidents occurred when the main rotor blades made contact with the fuselage. Mast bumping occurred before or just after the contact was made. The Alert further stated that mast bumping may occur with a teetering rotor system when excessive main rotor flapping results from main rotor blade stall, low g (load factor below 1.0), abrupt control input, or some combination of these elements.

An FAA official from the certification office in Texas stated that this alert was mailed to all registered operators of R-22 and R-44 helicopters. According to the owner of N83112, the leasing company never received a copy of AC No. 43-16, and experienced difficulty in receiving a copy from the FAA. During a conversation with an official from Robinson Helicopter, Robinson Helicopter also never received AC No. 43-16, dated July 22, 1994, from the FAA.

The helicopter wreckage was released to:

Glen Brown (President-Raleigh Helicopters) Hwy 64 East Knightdale, North Carolina

 National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ATL94FA179			
		Occurrence Date: 09/28/1994			
		Occurrence Type: Accident			
Landing Facility/Approach Information					
Airport Name RALEIGH EAST	Airport ID: W17	Airport Elevation 313 Ft. MSL	Runway Used 19	Runway Length 3000	Runway Width 60
Runway Surface Type: Asphalt					
Runway Surface Condition:					
Approach/Arrival Flown: NONE					
VFR Approach/Landing: None					
Aircraft Information					
Aircraft Manufacturer ROBINSON		Model/Series R-22B /R-22B		Serial Number 2446	
Airworthiness Certificate(s): Normal					
Landing Gear Type: Skid					
Amateur Built Acft? No	Number of Seats: 2	Certified Max Gross Wt. 1370 LBS	Number of Engines: 1		
Engine Type: Reciprocating	Engine Manufacturer: LYCOMING	Model/Series: O-320-B2C	Rated Power: 160 HP		
- Aircraft Inspection Information					
Type of Last Inspection 100 Hour	Date of Last Inspection 08/1994	Time Since Last Inspection 48 Hours	Airframe Total Time 124 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?/Type No	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner TRIANGLE HELICOPTER LLC		Street Address 3424 BELLEVUE RD			
		City RALIEGH	State NC	Zip Code 27609	
Operator of Aircraft RALEIGH HELICOPTERS		Street Address HIGHWAY 64 EAST			
		City KNIGHTDALE	State NC	Zip Code 27545	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held: None					
Air Carrier Operating Certificate(s):					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 91: General Aviation					
Type of Flight Operation Conducted: Business					

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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 35
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Sex: M	Seat Occupied: Right	Occupational Pilot? <input type="checkbox"/> Civilian Pilot <input type="checkbox"/>	Certificate Number: On File
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Certificate(s): Flight Instructor; Commercial

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

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Airplane

Instructor Rating(s): Helicopter

Current Biennial Flight Review?

Medical Cert.: Class 2	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam:
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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	790	305	398	19	35	12	36	373		
Pilot In Command(PIC)	704	305	363	12	34	12	36	349		
Instructor	140	140			11			140		
Instruction Received										
Last 90 Days	132	123	9		11			123		
Last 30 Days	40	40			4			40		
Last 24 Hours										

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

Type of Flight Plan Filed: None

Departure Point Same as Accident/Incident Location	State	Airport Identifier W17	Departure Time 0945	Time Zone EDT
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Destination Local Flight	State NC	Airport Identifier W17	
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Type of Clearance: None

Type of Airspace: Class G

Weather Information

UAT/CA Source of Wx Information:

No record of briefing

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	Occurrence Type: Accident

Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
RDU	0954	EDT	437 Ft. MSL	18 NM	280 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			0 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Broken		300 Ft. AGL		Visibility: 0.75 SM	Altimeter: 29.00 "Hg
Temperature: 17 °C	Dew Point: 17 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: Variable		Wind Speed: Light and \		Wind Gusts:	
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM				
Precip and/or Obscuration:					

Accident Information		
Aircraft Damage: Destroyed	Aircraft Fire: Ground	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					
- TOTAL ABOARD -	1				1
Other Ground	0	0	0		0
- GRAND TOTAL -	1	0	0		1

National Transportation Safety Board

FACTUAL REPORT
AVIATION

NTSB ID: ATL94FA179

Occurrence Date: 09/28/1994

Occurrence Type: Accident

Administrative Information

Investigator-In-Charge (IIC)

PHILLIP POWELL,

Additional Persons Participating in This Accident/Incident Investigation:

MATTHEW ELLIS
ARLINGTON, TX

JOSEPH F MANNO
WASHINGTON, DC

LARRY LAMBERT
MORRISVILLE, NC

BOB HENLEY
WASHINGTON, DC