



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	EAST NORTH PORT, NY	<b>Accident Number:</b>	IAD00LA054
<b>Date &amp; Time:</b>	07/01/2000, 1602 EDT	<b>Registration:</b>	N94RP
<b>Aircraft:</b>	Robinson R-22B	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	1 Serious, 1 Minor
<b>Flight Conducted Under:</b>	Part 91: General Aviation -		

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## Analysis

During an aerial photography flight, the helicopter made three circles around some property, and then proceeded to the south. At this point, the passenger looked out the windshield and noticed that they were just above the treetops, about 100-250 above ground level, with a very slow forward airspeed. The helicopter then began to shake and began a high descent rate to the ground. During the descent, the passenger saw the pilot making a lot of control movements, and noted that the low rotor RPM warning horn and light stayed on from the time the helicopter started shaking all the way to the ground. Examination of the helicopter revealed that the collective was found in the full up position, the rotor blades were bent up, and tree limbs were strewn around the accident site. The pilot operating handbook stated that when the low rotor RPM warning horn and caution light are activated, rotor RPM is below safe limits, and the pilot should immediately roll on throttle, lower collective, and in forward flight apply aft cyclic. Examination of the helicopter revealed there were no mechanical malfunctions.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's failure to maintain adequate rotor RPM and failure to follow published recovery procedures after the low rotor RPM warning horn and caution light activated.

## Findings

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Occurrence #1: LOSS OF CONTROL - IN FLIGHT  
Phase of Operation: MANEUVERING

### Findings

1. (C) ROTOR RPM - NOT MAINTAINED - PILOT IN COMMAND
2. (C) PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND

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Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER  
Phase of Operation: DESCENT - UNCONTROLLED

### Findings

3. OBJECT - TREE(S)

## Factual Information

On July 1, 2000, at 1602 Eastern Daylight Time, a Robinson R-22 Beta, N94RP, was substantially damaged after it collided with terrain on residential property while maneuvering over East North Port, New York. The certificated commercial helicopter pilot was seriously injured and the passenger sustained minor injuries. The helicopter departed Republic Airport, Farmingdale, New York, at 1545, on a local aerial photography flight. Visual meteorological conditions prevailed and no flight plan was filed for the flight conducted under 14 CFR Part 91.

In a written statement dated July 1, 2000, the pilot said:

"My memory is vague. I cannot recall vibrations or noises prior to the incident. That is the extent of information I recall before and at the time of the incident."

A Federal Aviation Administration (FAA) inspector interviewed the pilot on July 7, 2000. According to the inspector's record of conversation:

"[The pilot] stated his airspeed prior to his accident on July 1, 2000, was approximately 50 knots and he stated his altitude was approximately 300 feet. He stated he did not recall hearing a warning horn or lights in the cockpit prior to impact. [The pilot] stated he was unsure if there was an engine problem or if the engine was developing power prior to the accident.'

"[The pilot] was asked if he was familiar with the term 'settling with power', and he stated 'yes'. The inspector asked if 'settling with power' could have been the cause of the accident, and [the pilot] stated 'yes, that could have been the problem.'

The passenger was an aerial photographer and reported that he had accrued over 160 flight hours as a student pilot in the R-22, and over 200 hours working in them for his aerial photography business. He sat in the left seat, and the operator had removed the left door, torque pedals and t-bar section of the cyclic prior to departure. The vertical section of the cyclic remained installed. The passenger was interviewed over the telephone. According to the record of conversation, he said:

"On July 1, 2000, I had scheduled a helicopter and pilot to fly me over the Long Island area so I could photograph some real estate. The operator assigned me a new pilot, whom I never flew with or had met before. We departed Islip about 1:25 PM and headed to the north shore of Long Island. After a period of time, we had to refuel and flew to Republic Airport. At Republic, we filled the helicopter's left fuel tank with 9.3 gallons of fuel. The auxiliary tank was probably half full. We departed Republic and flew to the northeast towards North Port. We flew over a site and the helicopter made three circles. I was concentrating on taking photographs. When we were done with that site we turned to the south. Once we headed towards the south, I remember looking out of the windshield and seeing that we were just above the trees moving at a very slow forward speed. Our height above the ground was between 100-250 feet. We got extremely slow and the helicopter started shaking, and wobbled with a high descent rate to the ground. While descending I remember seeing the pilot out of the corner of my eye, and he was making a lot of control movements. The low rotor RPM warning horn and light stayed on from the time the helicopter started shaking all the way to the ground. We landed very hard and I think I hit my head on the cyclic."

An FAA inspector performed an on-site examination on July 1, 2000. According to the

inspector, the helicopter's left skid had collapsed and the helicopter came to rest on its left side in the backyard of a private residence. The main rotor made contact with a tree and broken tree limbs were strewn profusely about the backyard.

The drive belts were off, but not broken. The rotor blades were bent up, but not broken, and there was no damage to the tail boom. The main fuel tank was almost full and the auxiliary tank was about half full. The collective was found in the full up position.

According to the inspector, an R-22 Pilot Operating Handbook (POH) was found inside the helicopter.

Examination of the R-22 POH revealed that the low rotor RPM warning light and horn indicate rotor RPM at 95 percent or below. The Limitations section of the POH stated that the minimum rotor speed limit with power on was 97 percent, and an actual RPM of 495.

Also, the Emergency Procedures section of the POH stated that when the Low Rotor RPM Warning Horn and Caution Light are activated, the pilot should:

"Immediately roll on throttle and lower collective. In forward flight also apply aft cyclic. The sound of a loud warning horn and illuminated amber caution light indicates the rotor RPM is below safe limits. The horn stops and the amber caution light extinguishes when the RPM is increased to safe limits or when the collective control is full down."

According to FAA publication AC 61-13B, Basic Helicopter Handbook, it stated:

'Recovery from Low Rotor RPM is a procedure to return to the normal rotor operating RPM. This recovery procedure, if performed properly, will normally regain lost rotor RPM while still maintaining flight. A low rotor RPM condition is the result of having an angle of attack on the main rotor blades (induced by too much upward collective pitch) that has created a drag so great that engine power available, or being utilized, is not sufficient to maintain normal rotor operating RPM.'

'When a low rotor RPM condition is realized, immediately lower the collective pitch. This action will decrease the angle of attack on the main rotor blades which, because of the reduced rotor drag, will momentarily relieve excess engine load.'

'If recovery from a low rotor RPM condition is not made soon enough, lifting power of the main rotor blades will be lost, including pedal effectiveness.'

Review of the Safety Tips section in the R-22 POH revealed R22 Helicopter Safety Notice SN-24, titled, Low RPM Rotor Stall Can Be Fatal. The notice stated:

'Rotor stall due to low RPM is still involved in more helicopter accidents, both fatal and non-fatal, than any other contributing factor.'

'Rotor stall can occur at any airspeed and when it does, the rotor stops producing lift required to support the helicopter and the aircraft literally falls out of the sky.'

Also found in the R22 POH was R22 Helicopter Safety Notice SN-12, titled, Fatal Accidents Caused By Low RPM and Rotor Stall. This notice stated:

'Several fatal accidents have resulted from failure of the student or low-time pilot to recognize and correct low rotor RPM condition in time to prevent stalling the rotor. No failure of the helicopter was involved.'

The pilot reported a total of 174 total flight hours in helicopters, of which 158 hours were in make and model. He also reported that there were no mechanical deficiencies with the helicopter.

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	27, Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	01/22/2000
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	174 hours (Total, all aircraft), 158 hours (Total, this make and model), 114 hours (Pilot In Command, all aircraft), 44 hours (Last 90 days, all aircraft), 5 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Robinson	<b>Registration:</b>	N94RP
<b>Model/Series:</b>	R-22B R-22B	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	2422
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	07/15/1999, Annual	<b>Certified Max Gross Wt.:</b>	1370 lbs
<b>Time Since Last Inspection:</b>	65 Hours	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	401 Hours	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Not installed	<b>Engine Model/Series:</b>	O-320-B2C
<b>Registered Owner:</b>	EASTERN HELICOPTERS, INC	<b>Rated Power:</b>	124 hp
<b>Operator:</b>	EASTERN HELICOPTERS, INC	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	FRG, 82 ft msl	Distance from Accident Site:	10 Nautical Miles
Observation Time:	1553 EDT	Direction from Accident Site:	30°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	10 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	10 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	200°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	24° C / 16° C
Precipitation and Obscuration:			
Departure Point:	FARMINGDALE, NY (FRG)	Type of Flight Plan Filed:	None
Destination:	ISLIP, NY (ISP)	Type of Clearance:	None
Departure Time:	1545 EDT	Type of Airspace:	Class E

## Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	1 Minor	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 Serious, 1 Minor	Latitude, Longitude:	

## Administrative Information

Investigator In Charge (IIC):	LEAH D YEAGER	Report Date:	12/18/2001
Additional Participating Persons:	JOHN CHEN; FARMINGDALE, NY		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinquiry@ntsb.gov">pubinquiry@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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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](#).