

		NTSB ID: LAX00FA306		Aircraft Registration Number: N8313Z	
		Occurrence Date: 08/18/2000		Most Critical Injury: Fatal	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place WATSONVILLE		State CA	Zip Code 95076	Local Time 1755	Time Zone PDT
Airport Proximity: Off Airport/Airstrip		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Robinson		Model/Series R22 BETA		Type of Aircraft Helicopter	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
HISTORY OF FLIGHT					
<p>On August 18, 2000, about 1755 Pacific daylight time, a Robinson R22 Beta, N8313Z, experienced the in-flight separation of its main rotor blade assembly while cruising or maneuvering. The helicopter, in an uncontrolled descent, crashed into a plowed field and burned near Watsonville, California. Visual meteorological conditions prevailed, and no flight plan was filed for the local area instructional flight. The flight instructor, who held an airline transport pilot certificate, and the student pilot were fatally injured. The helicopter, which was registered to and operated by the flight instructor, was destroyed. The flight was performed under 14 CFR Part 91 and originated from the Watsonville Municipal Airport, Watsonville, about 1715.</p> <p>Santa Cruz County Sheriff's department personnel reported that their investigation indicated the flight instructor had an appointment at the Watsonville Airport about 1600. Airport personnel reported to the National Transportation Safety Board investigator that this was the student's first flight in the Robinson helicopter, and it was considered to be a "familiarization" flight.</p> <p>Five ground-based witnesses, who reported observing the helicopter during the accident sequence, were subsequently interviewed. In summary, they reported the following information. Three of the witnesses were driving separate work trucks eastbound along the same road, and two were standing together in a parking lot in Watsonville. The lead driver heard a loud noise, looked up and saw a helicopter headed nose down with pieces of metal coming off it. He saw no smoke or flames, but he saw the helicopter hit the ground, followed by a resulting explosion and flames. The second and third drivers saw the helicopter flying in a straight and level attitude seconds before the crash. The second driver reported hearing a loud noise and described a blade detaching from the helicopter as it descended and vanished behind an embankment. The third driver, who had his truck windows rolled up, reported hearing only what he described as normal helicopter noise and then seeing the blades come off the helicopter, after which the helicopter headed nose down. None of these three witnesses saw any smoke or fire before impact, and none saw any other aircraft in the area at the time of the accident.</p> <p>One of the two witnesses standing in the parking lot stated he was looking toward the west when he observed the helicopter flying toward him and heard what he described as normal helicopter noise. He noticed a "movement" and then another "larger movement" in the helicopter. He said it looked like the helicopter was flying just above some telephone poles, and then it appeared to make a right turn back to the west and started to climb. During the turn, he heard the sound of "something speeding up." At that point, the helicopter seemed to explode; in his words some other "material" became visible in the air. Then the helicopter descended rapidly to the ground. This man stated he saw what looked to him like smoke in the air after the explosion, but no flames while the helicopter was in the air. The second man in the parking lot heard an unusual loud noise, which caused him to look up and see the helicopter fall rapidly to the ground. He saw flames after</p>					
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impact, but did not have enough time to observe whether there were flames while the helicopter was in the air. Neither man reported seeing any other aircraft in the area at the time of the accident.

FLIGHT INSTRUCTOR INFORMATION

The flight instructor possessed an airline transport pilot certificate with multiengine land privileges. He had commercial pilot privileges in single engine land airplanes and helicopters. He held flight engineer, ground instructor, and airframe and powerplant mechanic certificates. He was a certified flight instructor for single engine and multiengine airplanes, and rotorcraft helicopters. On April 4, 2000, he was issued a second-class aviation medical certificate with the restriction that he must wear corrective lenses.

The National Transportation Safety Board investigator was provided with a photocopy of a portion of the instructor's flight logbook records for review. In part, the records covered the time period between 1984 and 1997. The executor of the instructor's estate reported that no current flight logbook records were located. The most recent logbook record, contained in logbook number 4, was observed to have an ending date of October 25, 1997. The records indicated that the instructor received dual flight instruction in the Robinson R22 starting in January 1996. In May 1996, he attended a safety course for pilots at the Robinson Helicopter Company. On his course application form, he indicated that his total helicopter flying experience was 1,000 hours, and his flying experience in the R22 was 10 hours.

Thereafter, he flew the Robinson R22 for over 400 hours. His logbook also indicates that during this period he flew the R22 to and performed in over 2 dozen air shows throughout the United States. On May 26, 1999, the Federal Aviation Administration issued the instructor a Statement of Acrobatic Competency.

The hours indicated in this report are estimates, and are also based in part upon the instructor's medical application data supplied to the Federal Aviation Administration (FAA). The instructor's estimated total flight time was about 16,000 hours. He had in excess of 400 hours flight time piloting the Robinson R22. The number of hours of dual flight instruction given was not determined. However, according to the FAA, the instructor had trained at least one student in rotorcraft.

STUDENT PILOT INFORMATION

The student pilot did not possess any FAA pilot or medical certificates. The student's father reported to the Safety Board investigator that he took his son flying in a Cessna 152 several years prior to the accident. In addition, about 6 months before the accident, the student flew in a helicopter. The father stated that these were the only two flights that he was aware his son had taken.

HELICOPTER INFORMATION

The helicopter, serial number 2456, was manufactured in July 1994 and was issued a Standard Airworthiness Certificate. The flight instructor purchased the helicopter in May 1999, and he maintained it by performing 100-hour inspections.

In February 2000, the FAA granted approval to the Robinson Helicopter Company (RHC) to increase the airframe time between overhauls (TBO) for Robinson R22 helicopters to 2,200 hours. A review of the accident helicopter's airframe and engine logbooks revealed that the helicopter had been maintained on a 100-hour and annual inspection basis.

The last maintenance entry shown in the helicopter's aircraft and engine logbooks was dated July

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10, 2000. On this date, the helicopter received a 100-hour inspection that was signed by the flight instructor/mechanic. There was also an annual inspection signoff by another mechanic having inspection authorization. The listed total aircraft and engine time was 2,099.9 hours.

A search of the Safety Board's accident database indicated that the helicopter had no previous accident history. An examination of the helicopter's logbook similarly did not reveal evidence of any accident-related repairs.

METEOROLOGICAL INFORMATION

The closest aviation weather observation station to the accident site is located about 2.4 nautical miles north of the crash site at the Watsonville Municipal Airport. At 1753, Watsonville's automated surface observing system reported a clear sky condition. The surface wind was from 190 degrees at 8 knots, and the temperature was 71 degrees Fahrenheit.

COMMUNICATION

A search of nearby FAA facilities did not reveal evidence that any air-to-ground communications or services had been provided to the accident helicopter.

WRECKAGE AND IMPACT INFORMATION

The on-scene examination of the accident site and wreckage revealed that the helicopter and separated components came to rest in an open flat plowed field, on an adjacent roadway, and in a lettuce field. The accident site was about 2 miles south of the Watsonville Airport, at an estimated elevation of 150 (or less) feet mean sea level.

The mast, skid tubes, engine, tail boom, and the tail rotor assembly were found at the main impact crater/wreckage site. The main wreckage was found principally oriented toward 160 degrees, magnetic.

The cockpit was found in an upright attitude at the bottom of an estimated 2-foot-deep impact crater. The cabin area was pitched downward at a 45- to 60-degree angle. The cabin area exhibited soot pattern fire evidence consistent with it having been partially consumed in a post impact ground fire. Fragments from the bubble were observed principally scattered in the field several yards south and southeast of the main wreckage.

At the main wreckage impact site, the outer surface of the left skid tube was found impact damaged and it was partially crushed in an inward direction and scratched in two locations about 3 feet apart. The deformation to the skid tube and the skid tube contact signature evidence terminated at the union between the skid tube and the left side of the aft strut.

Plexiglas, left cabin doorframe material and headphone fragments were found about 400 feet north of the main wreckage. The side (cup) of one headphone set was found shattered. The corresponding right side was found intact. Fragments from the shattered cup were located along the wreckage distribution path in the field located farthest away from where the main wreckage came to rest.

Sunglasses, the swash plate boot, and other material were found between 250 and 330 feet north of the wreckage. The left side landing gear skid tube's ground handling wheel bracket was found separated from the skid tube, and it was located in the field approximately 145 feet north of the main wreckage. The bracket was deformed and dented on its outer surface.

In the area where the bracket had been mounted, the outer surface of the left skid tube was observed similarly dented. A deformation pattern in one of the main rotor blades appeared consistent in appearance with the surface damage signature observed in the outboard side of the

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left skid tube.

The two main rotor blades were found attached to the hub assembly, and these components were located about 140 feet west of the main wreckage. The main rotor (drive) shaft was observed broken a few inches below the hub. The main rotor blades' spindle tusks were observed broken from the blade spindles. The two tusks were not located. Neither of the main rotor blades exhibited evidence of upward blade coning. Torsional deformation in the area of the mast was noted at the location where the mast had separated near the base of the hub.

No preimpact signature evidence was observed in the tailboom structure. The tail rotor system including the pitch change links and the gearbox were found devoid of preimpact damage evidence.

MEDICAL AND PATHOLOGICAL INFORMATION

Airport personnel who knew the flight instructor reported to the Safety Board investigator that on the day of the accident flight he looked and acted normal.

On August 14, 2000, the flight instructor had undergone surgery on an outpatient basis at the Santa Cruz Medical Clinic, a local medical facility. According to the instructor's sister, her brother "did well" and did not return to the medical facility for follow-up treatment. There were no complications from the procedure.

Between August 21 and 22, 2000, autopsies were performed by the Santa Cruz County Sheriff/Coroner's Office, at 701 Ocean Street, Room 340, Santa Cruz, California, 95060. The Sheriff/Coroner had the Institute of Forensic Sciences perform toxicology tests on specimens from both occupants of the helicopter. No evidence of drugs or ethanol was found.

The manager of the FAA's Toxicology and Accident Research Laboratory reported that the results of its toxicology tests on both occupants were also negative for all screened drugs and ethanol.

TESTS AND RESEARCH

Engine Examination.

The engine exhibited extensive fire damage. All accessories were found attached to the engine and were externally fire damaged. The engine was partially disassembled, and no discontinuities or broken gear teeth were observed. The crankshaft could not be rotated. All of the spark plugs were removed, and their electrodes appeared gray in color with normal wear signatures, according to the engine participant. The participant also reported, following his Safety Board supervised examination, that the engine's internal integrity was confirmed. No evidence of preimpact discrepancies was found.

Airframe Examination and Main Rotor Blade-to-Fuselage Contact Mast Bumping Signatures.

The main rotor blade tip weights were found seated in each blade, and the blades were impact damaged. The spars were found integral to the blades. One blade was found bent in a downward direction from the spindle outboard along a 7-foot blade span. The other blade was similarly bent in a downward direction along a 4-foot blade span. A black colored transfer of an unidentified material was observed smeared onto the leading edge of this blade, in an impacted area, about 9 1/2 feet outboard from the hub.

The aft portion of the left skid tube, in the vicinity of where the ground-handling wheel bracket had been attached, was placed adjacent to the bent portion of this main rotor blade. The deformed area of the rotor blade was similar in appearance to the impact damage observed on the skid tube.

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The main rotor hub and spindles were partially disassembled and examined. Indentations and chipped primer on both ends of the hub were observed in positions corresponding to the spindles. The spindles were examined and found to have sheared droop stop tusks. The sheared tusks were symmetrical for each main rotor blade spindle. Both droop stops were found integral to their mast attachment points and exhibited compression damage. The main rotor blade grips had scoring on their inboard faces.

The main rotor drive shaft was found broken, as measured from the teeter bolt center, about 8 inches down from the center of the teeter bolt. In this area, the shaft appeared torsionally twisted off in a direction consistent with engine torque application. The fracture surface was bright, shiny, angled, and twisted in a torsional direction. No visual evidence of fatigue was found. No signs of corrosion were found in the inner surface area of the mast.

In the hub assembly, the following components were found deformed: (1) The elastomeric teeter stops on both sides of the shaft were crushed and split in half. (See the Robinson Helicopter Company (RHC) illustrated parts catalog (IPC) item number 23 for a drawing of this part.); (2) The associated teeter stop bracket (IPC #22) was found dented. Also, its associated bracket was observed crushed at a location adjacent to the droop stops; and (3) Impressions in the main rotor hub between 1 and 2 inches inboard of its outer surfaces were found that matched the size and shape of the main rotor spindle tusk fracture surfaces. The Robinson participant indicated that the aforementioned signatures are indicative of the main rotor blades having over-traveled in a downward direction.

ADDITIONAL INFORMATION

The FAA's Los Angeles Certification Office project manager has oversight for the Robinson R22 and R44 helicopters for airframe issues. The manager attended the structural examination of the accident helicopter on September 12, 2000. The manager verbally indicated to the Safety Board's investigator that he did not observe any evidence of a preimpact mechanical problem with the helicopter, which would have instigated the in-flight breakup sequence and the accident.

The RHC published Safety Notice "SN-11," in which the company cautioned "push-overs can be catastrophic." The notice was originally issued in October 1982 and revised in June 1994. In part, the notice stated that fatal accidents have been caused by pilots pushing the cyclic forward, putting the helicopter into a low-G (weightless) flight condition. Such action may result in the helicopter rolling rapidly to the right. Thereafter, "if the pilot attempts to stop the right roll by applying full left cyclic before regaining main rotor thrust, the rotor can exceed its flapping limits and cause structural failure of the rotor shaft due to mast bumping or allow a blade to contact the airframe."

The helicopter wreckage was released to the owner's assigned insurance adjuster on September 13, 2000. No parts were retained.

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Landing Facility/Approach Information					
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used	Runway Length	Runway Width
Runway Surface Type: Unknown					
Runway Surface Condition: Unknown					
Type Instrument Approach: Unknown					
VFR Approach/Landing: Unknown					
Aircraft Information					
Aircraft Manufacturer Robinson		Model/Series R22 BETA		Serial Number 2456	
Airworthiness Certificate(s): Normal					
Landing Gear Type: Skid					
Homebuilt Aircraft? 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: 180 HP		
- Aircraft Inspection Information					
Type of Last Inspection Annual	Date of Last Inspection 07/2000	Time Since Last Inspection Hours	Airframe Total Time 2100 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed?	ELT Operated?	ELT Aided in Locating Accident Site?			
Owner/Operator Information					
Registered Aircraft Owner KENT K. REINHARD		Street Address			
		City APTOS	State CA	Zip Code 95003	
Operator of Aircraft Same as Reg'd Aircraft Owner		Street Address Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
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: Instructional					

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First Pilot Information

Name On File	City On File	State On File	Date of Birth On File	Age 57
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport; Flight Instructor; Flight Engineer

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

Rotorcraft/Glider/LTA: Helicopter

Instrument Rating(s): Airplane

Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine; Helicopter

Type Rating/Endorsement for Accident/Incident Aircraft? No	Current Biennial Flight Review?
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Medical Cert.: Class 2	Medical Cert. Status: Valid Medical--w/ waivers/lim.	Date of Last Medical Exam: 04/2000
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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	16000	400						1400		
Pilot In Command(PIC)										
Instructor										
Last 90 Days										
Last 30 Days										
Last 24 Hours										

Seatbelt Used?	Shoulder Harness Used?	Toxicology Performed? Yes	Second Pilot? Yes
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Flight Plan/Itinerary

Type of Flight Plan Filed: None

Departure Point Same as Accident/Incident Location	State	Airport Identifier WVI	Departure Time 1715	Time Zone PDT
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Destination Local Flight	State	Airport Identifier WVI	
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Type of Clearance: None

Type of Airspace: Class G

Weather Information

Source of Briefing: No record of briefing

Method of Briefing: Unknown

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Weather Information

WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
WVI	1753	PDT	160 Ft. MSL	2 NM	348 Deg. Mag.
Sky/Lowest Cloud Condition: Clear			Ft. AGL	Condition of Light: Day	
Lowest Ceiling: None		Ft. AGL	Visibility: 10	SM	Altimeter: 30.00 "Hg
Temperature: 22 °C	Dew Point: 12 °C	Wind Direction: 190		Density Altitude: Ft.	
Wind Speed: 8	Gusts:	Weather Conditions at Accident Site: Visual Conditions			
Visibility (RVR): Ft.	Visibility (RVV)	SM	Intensity of Precipitation:		
Restrictions to Visibility: None					
Type of Precipitation: None					

Accident Information

Aircraft Damage: Destroyed	Aircraft Fire: Ground	Aircraft Explosion: None
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Classification: U.S. Registered/U.S. Soil

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot					
Second Pilot					
Student Pilot	1				1
Flight Instructor	1				1
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABOARD -	2				2
Other Ground	0	0	0		0
- GRAND TOTAL -	2	0	0		2

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Administrative Information

Investigator-In-Charge (IIC)
WAYNE POLLACK

Additional Persons Participating in This Accident/Incident Investigation:

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