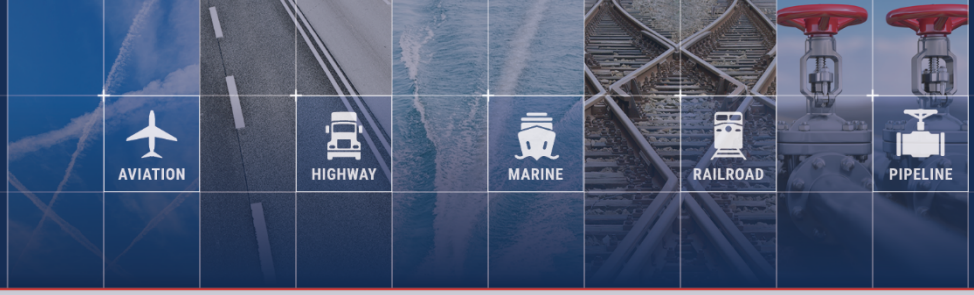

Aviation Investigation Final Report

Location:	TULSA, Oklahoma	**Accident Number:**	FTW94FA158
Date & Time:	May 16, 1994, 15:02 Local	**Registration:**	N47GY
Aircraft:	BELL 47G-2	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Ferry		

Analysis

WITNESSES HEARD A LOUD NOISE AND SAW AN OBJECT SEPARATE FROM THE SECOND OF TWO HELICOPTERS. THIS HELICOPTER THEN IMPACTED INVERTED IN THE BACK YARD OF A RESIDENCE. THE LEFT SYNCHRONIZED ELEVATOR AND END CAP WERE FOUND 240 FEET AWAY. AN INDENTATION ON THE LEADING EDGE OF ONE OF THE MAIN ROTOR BLADES MATCHED THAT OF THE END CAP. THE PILOT OF THE FIRST HELICOPTER SAID HE HAD WARNED THE SECOND PILOT OF A FLOCK OF BIRDS, AND THAT HE HAD TO BANK SHARPLY TO AVOID HITTING THEM. WHEN HE RECEIVED NO REPLY, HE TURNED AROUND BUT THE OTHER HELICOPTER WAS NOT IN SIGHT.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: IN FLIGHT LOSS OF CONTROL DUE TO THE PILOT'S IMPROPER USE OF THE CYCLIC AND COLLECTIVE CONTROLS WHEN HE MANEUVERED ABRUPTLY TO AVOID COLLIDING WITH A FLOCK OF BIRDS. FACTORS WERE THE BIRDS AND THE INFLIGHT SEPARATION OF THE LEFT SYNCHRONIZED ELEVATOR.

Findings

Occurrence #1: ABRUPT MANEUVER
Phase of Operation: CRUISE - NORMAL

Findings

1. (F) OBJECT - BIRD(S)
2. (C) CYCLIC - IMPROPER USE OF - PILOT IN COMMAND
3. (C) COLLECTIVE - IMPROPER USE OF - PILOT IN COMMAND

Occurrence #2: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: MANEUVERING

Findings
4. (F) ROTORCRAFT FLIGHT CONTROL,SYNCHRONIZED ELEV CTL - SEPARATION

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - RESIDENTIAL AREA

Factual Information

HISTORY OF FLIGHT

On May 16, 1994, at 1502 central daylight time, N47GY, a Bell 47G-2, was destroyed when it impacted terrain during an uncontrolled descent in Tulsa, Oklahoma. The commercial pilot was fatally injured. Visual meteorological conditions prevailed for the ferry flight.

Eye witnesses were interviewed and thirteen witness' statements were submitted. The consensus of these statements revealed:

The accident helicopter was following a lead helicopter [both helicopters were enroute to Tulsa Helicopters, Inc., a helicopter repair facility, for maintenance to be performed on the accident helicopter (see attached map)].

Five witnesses reported hearing a loud "pop," "exploding," or "backfire" noise.

Two witnesses indicated that there was a power loss.

Eight witnesses saw something separate from the helicopter.

One witness saw the helicopter tilt left and go sideways. "I could see top of rotors from my view point which told me copter was completely sideways," he wrote. Another witness verbally reported seeing the helicopter roll 90 degrees to the left, and said he also saw the top of the rotor disc.

Five witnesses said the helicopter went inverted, four witnesses said the helicopter entered a spin or spiral, and another witness said it "tumbled."

WRECKAGE AND IMPACT INFORMATION

The helicopter impacted the back yard of a residence at 3324 E. 83rd Place, causing minor damage to the chimney structure. Two of the three longitudinal tail boom trusses were found severed. Approximately 240 feet away, on the west side of Harvard Avenue, the left synchronized elevator and end cap were located. These were the only parts that were found to have separated from the helicopter. One of the main rotor blades had an indentation on its leading edge near the blade tip. Measurements made on this indentation matched those made to the elevator end cap.

MEDICAL AND PATHOLOGICAL INFORMATION

An examination of the body was performed by the Oklahoma State Medical Examiner's Office in Oklahoma City, Oklahoma. Toxicological examination by the FAA's Civil Aeromedical Institute (CAMI) disclosed 32.000 (ug/ml, ug/g) salicylate in the urine. According to a CAMI spokesman, salicylate is the same as aspirin.

TESTS AND RESEARCH

A metallurgical examination of the fractured surfaces concluded that they were the result of overload forces.

Measurements taken from a three dimensional scale drawing of the Bell 47G-2 indicate that in order for the main rotor blade to contact the synchronized elevator, the rotor system would have to tilt aft approximately 18 degrees.

According to a report by Bell Helicopter's Rotor System Design Group, static stops limit the angular movement of the rotor mast. In a static state, the rotor blades will clear the tailboom about 14 inches. The report noted, "In trimmed, high speed forward flight, the rotor would have about 8 degrees of collective pitch, and 8 degrees of cyclic pitch, and the rotor flapping would be near 0 degrees. However, an unusual and violent maneuver such as a maximum rate drop of the collective pitch with full aft cyclic pitch applied simultaneously could command aft flapping exceeding the stop-to-stop clearance. Under this circumstance, heavy flapping stop contact could occur, and with large mast and blade bending deflections a blade strike on the tail boom is possible."

ADDITIONAL INFORMATION

The lead helicopter pilot said that shortly after departing the airport, he was forced to bank sharply to avoid a flock of birds. He radioed this information to the second helicopter pilot but received no reply. When he turned around, the second helicopter was not in sight.

A "Release of Aircraft Wreckage," NTSB Form 6120.15, was executed on August 3, 1994, but it was never returned by the owner.

Pilot Information

Certificate:	Commercial; Private	**Age:**	64,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	August 30, 1993
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	3919 hours (Total, all aircraft), 24 hours (Total, this make and model), 3283 hours (Pilot In Command, all aircraft), 58 hours (Last 90 days, all aircraft), 18 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	BELL	**Registration:**	N47GY
Model/Series:	47G-2 47G-2	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2207
Landing Gear Type:	Skid	**Seats:**	3
Date/Type of Last Inspection:	Unknown	**Certified Max Gross Wt.:**	2450 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	7844 Hrs	**Engine Manufacturer:**	LYCOMING
ELT:	Not installed	**Engine Model/Series:**	VO-435-A1D
Registered Owner:	CYPERT, GERALD	**Rated Power:**	260 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:	CYPERT AIRCRAFT SALES	**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	RVS ,638 ft msl	**Distance from Accident Site:**	2 Nautical Miles
Observation Time:	15:23 Local	**Direction from Accident Site:**	260°
Lowest Cloud Condition:	Scattered / 4500 ft AGL	**Visibility**	15 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	29°C / 16°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	JENKS , OK (RVS)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	14:55 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:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	36.020656,-95.929634(est)

Administrative Information

Investigator In Charge (IIC):	Scott, Arnold
Additional Participating Persons:	DONALD M COOK; OKLAHOMA CITY , OK
Original Publish Date:	December 7, 1994
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=18899