Aviation Investigation Final Report

Location:	GALVESTON, Texas	**Accident Number:**	FTW94FA231
Date & Time:	July 13, 1994, 08:38 Local	**Registration:**	N350WM
Aircraft:	AEROSPATIALE AS-350B1	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	4 Fatal, 1 Serious
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

THE PILOT REPORTED THAT THE HELICOPTER WAS CLIMBING THROUGH '...2,000 FEET WHEN A BUMP SIMILAR TO TURBULENCE WAS FELT. ANOTHER BUMP WAS FELT, FOLLOWED BY A MORE PRONOUNCED BUMP, THEN AIRCRAFT CONTROL WAS LOST.' HE ADDED THAT THE CYCLIC AND COLLECTIVE WERE UNRESPONSIVE. THE HELICOPTER IMPACTED THE WATER IN THE GULF OF MEXICO APRX 11 MILES OFFSHORE. ALL MAJOR COMPONENTS, EXCEPT THE VERTICAL FIN AND TAILROTOR GEARBOX, WERE RECOVERED. DURING A RECONSTRUCTION OF THE HELICOPTER, THE LEFT LATERAL SERVO ROD END WAS FOUND DISCONNECTED FROM THE SERVO EXTENSION. THE THREADS ON THE ROD END WERE INTACT AND APPEARED UNDAMAGED; HOWEVER, ONLY REMNANTS OF THE MATING INTERNAL THREADS IN THE SERVO EXTENSION REMAINED. ALMOST THE ENTIRE THREAD PROFILE WAS WORN AWAY LEAVING ONLY THE THREADED AREA THAT HAD BEEN LOCATED WITHIN THE KEYWAY SLOT OF THE ROD END. THE ZER0-TIME SERVO HAD BEEN INSTALLED 416 FLIGHT-HRS BEFORE THE ACCIDENT. THE LEFT LATERAL SERVO, WHICH IS CONNECTED BY A PUSH ROD TO THE CONTROLS AT THE MAIN ROTOR HEAD, CHANGES THE ATTITUDE OF THE HELICOPTER BY CHANGING THE ANGLE OF ATTACK OF THE MAIN ROTOR BLADES.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: INADEQUATE TORQUING OF THE LEFT LATERAL SERVO BY MAINTENANCE PERSONNEL, WHICH ALLOWED IT TO BECOME DISCONNECTED FROM THE CONTROLS, LEADING TO AN IN-FLIGHT LOSS OF CONTROL.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CLIMB - TO CRUISE

Findings
1. (C) ROTORCRAFT FLIGHT CONTROL SYSTEM,PRIMARY SERVO - DISCONNECTED
2. (C) MAINTENANCE - INADEQUATE - OTHER MAINTENANCE PERSONNEL

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: CLIMB - TO CRUISE

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

Factual Information

HISTORY OF FLIGHT

On July 13, 1994, approximately 0838 central daylight time, an Aerospatiale AS350B1 helicopter, N350WM, was destroyed during a loss of control near Galveston, Texas. The commercial pilot was seriously injured and the four passengers were fatally injured. Visual meteorological conditions prevailed for the 14 CFR Part 135 air taxi flight.

An interview with the pilot revealed the following information. He had flown the aircraft the day prior to the accident. The helicopter was refueled at Galveston Aero Flight Center, Scholes Field (GLS), Galveston, Texas, and returned to Houston Gulf Airport (SPX), Houston, Texas. The aircraft post flight did not reveal any maintenance problems.

The morning of the accident, the helicopter was preflighted and departed at 0750 to pick up four passengers at Galveston Aero Flight Center. One passenger had never flown with Sea Link; therefore, a full passenger briefing was given to all passengers. All of the passengers fastened their seat belts. The aircraft departed approximately 0830 for an oil tanker 50 nautical miles southeast of Galveston.

The pilot reported that the aircraft was climbing through "2,000 feet when a bump similar to turbulence was felt. Another bump was felt, followed by a more pronounced bump, and then aircraft control was lost."

The pilot further reported that prior to water impact, the aircraft recovered to an almost level attitude, but in a right skidding turn with the nose slightly down. The pilot estimated that it took 30 to 40 seconds from the start of the event to water impact. The airspeed did not get below 70 or 80 knots.

The pilot added that the cyclic felt like it was disconnected, but not loose. Both the cyclic and collective were unresponsive.

He stated that he flew with no friction on the cyclic and minimal on the collective. The engine appeared to be running normal, and there were no warning lights illuminated. The rotor RPM increased but did not overspeed.

AIRCRAFT INFORMATION

A review of the airframe and engine records did not reveal any anomalies or uncorrected maintenance defects. A zero time servo was installed 416 hours prior to the accident on October 3, 1993 at 2,288 aircraft hours. An estimate of the weight of the helicopter at the time

of the accident placed it within weight and balance limits.

WRECKAGE AND IMPACT INFORMATION

The helicopter was located southeast of Galveston, Texas, approximately 11 miles off shore in the Gulf of Mexico at latitude 29 degrees 10.4 minutes north and longitude 94 degrees 42.2 minutes west. All major components were recovered, except the vertical fin and tailrotor gearbox.

The section from the cabin nose to the bulkhead behind the passenger compartment was separated from the floor up. The floor section remained partially attached to the fuselage only by cables. The tail boom was separated forward of the horizontal stabilizer. The main transmission and engine remained attached to the fuselage. Both skids remained attached to the fuselage; however, the forward portion of both skid tubes were separated forward of the forward cross tube.

TEST AND RESEARCH

During a reconstruction, flight control continuity was established to all controls up to the mixing unit located behind the 15 degree bulkhead. The following controls from the mixing unit to the main rotor were found disconnected: main rotor pitch change rod bearing (red blade), main rotor pitch change rod (yellow blade), fore and aft push rod to the servo, left lateral servo rod end from the servo.

The disconnected components were shipped to the National Transportation Safety Board, Office of Research and Engineering, Materials Laboratory, Washington, D.C., on November 14, 1994, for further examination and evaluation. The fractures of the pitch change rod bearing, pitch change rod, and the push rod, were the result of overstress forces and were not preexisting. The separation of the rod end fitting from the servo extension indicates preexisting long term wearing of the internal extension threads. See the enclosed report.

ADDITIONAL INFORMATION

The helicopter wreckage was released to the operator.

Pilot Information

Certificate:	Commercial	**Age:**	46,Male
Airplane Rating(s):	Single-engine land; Multi-engine land; Multi-engine sea	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 30, 1993
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	8076 hours (Total, all aircraft), 876 hours (Total, this make and model), 7056 hours (Pilot In Command, all aircraft), 188 hours (Last 90 days, all aircraft), 52 hours (Last 30 days, all aircraft), 4 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	AEROSPATIALE	**Registration:**	N350WM
Model/Series:	AS-350B1 AS-350B1	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2099
Landing Gear Type:	Skid	**Seats:**	6
Date/Type of Last Inspection:	May 16, 1994 100 hour	**Certified Max Gross Wt.:**	4850 lbs
Time Since Last Inspection:	96 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	2704 Hrs	**Engine Manufacturer:**	TURBOMECA
ELT:	Installed, not activated	**Engine Model/Series:**	ARRIEL 1D
Registered Owner:	AMERICAN EUROCOPTER CORP.	**Rated Power:**	684 Horsepower
Operator:	SEA-LINK HELICOPTERS, INC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	SEA-LINK	**Operator Designator Code:**	SYLA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GLS ,7 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	08:50 Local	**Direction from Accident Site:**	315°
Lowest Cloud Condition:	Scattered / 2000 ft AGL	**Visibility**	12 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	14 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	190°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	30°C / 25°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	Company VFR
Destination:	OIL TANKER , GM	**Type of Clearance:**	VFR on top
Departure Time:	08:30 Local	**Type of Airspace:**	Class E

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Destroyed
Passenger Injuries:	4 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 Fatal, 1 Serious	**Latitude, Longitude:**	29.3005,-94.789382(est)

Administrative Information

Investigator In Charge (IIC):	Wigington, Douglas
Additional Participating Persons:	JAMES M HALL; HOUSTON , TX
Original Publish Date:	October 31, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=18912