Aviation Investigation Final Report

Location:	JACKSON TWP, Pennsylvania	**Accident Number:**	NYC95FA050
Date & Time:	January 18, 1995, 18:05 Local	**Registration:**	N1WD
Aircraft:	AGUSTA A109C	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	3 Fatal
Flight Conducted Under:	Part 91: General aviation - Executive/Corporate		

Analysis

DURING AN IFR FLIGHT, THE HELICOPTER PILOT WAS PROCEEDING TOWARD THE DESTINATION WITH USE OF HIS LORAN. HE WAS CLEARED FOR A VOR/DME ALPHA APPROACH TO AN AIRPORT 3 MILES WEST OF THE DESTINATION HELIPAD. (PRESUMABLY, HE PLANNED TO PROCEED VFR FROM THE AIRPORT TO THE HELIPAD.) THE APPROACH CONTROLLER OBSERVED (ON RADAR) WHAT APPEARED TO BE A NORMAL APPROACH UNTIL CONTACT WAS LOST AT 700 FEET MSL. A WITNESS MID-WAY BETWEEN THE AIRPORT AND THE HELIPAD OBSERVED THE HELICOPTER WEST BOUND AT ABOUT 150 FEET. A WITNESS NEAR THE AIRPORT REPORTED THE HELICOPTER CIRCLED HIS HOUSE; HE THEN LOST SIGHT OF THE HELICOPTER WHEN IT FLEW NORTHWEST AT 200 FEET INTO THE CLOUDS. ANOTHER WITNESS ABOUT A MILE NORTHWEST OF THE AIRPORT HEARD THE HELICOPTER FLY OVERHEAD IN THE CLOUDS. BOTH WITNESSES REPORTED THE HELICOPTER DESCENDED OUT OF THE CLOUDS IN A STEEP DESCENT AND IMPACTED THE TERRAIN. EXAMINATION REVEALED THAT BOTH ENGINES WERE OPERATING; NO PREIMPACT AIRFRAME FAILURE WAS NOTED. THE WEATHER AT NEARBY AIRPORTS WAS REPORTED AS 600 FEET OBSCURED WITH DRIZZLE AND FOG. WITNESSES ESTIMATED THE CEILING AT THE ACCIDENT SITE TO BE 200 TO 400 FEET.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE PILOT'S IMPROPER IN-FLIGHT PLANNING/DECISION AND FAILURE TO MAINTAIN CONTROL OF THE AIRPLANE AFTER BECOMING SPATIALLY DISORIENTED. FACTORS RELATED TO THE ACCIDENT WERE: DARKNESS AND THE ADVERSE WEATHER CONDITIONS.

Findings

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

Findings
1. (F) LIGHT CONDITION - DARK NIGHT
2. (F) WEATHER CONDITION - LOW CEILING
3. (F) WEATHER CONDITION - DRIZZLE/MIST
4. (F) WEATHER CONDITION - FOG
5. (C) IN-FLIGHT PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
6. (C) AIRCRAFT CONTROL - NOT MAINTAINED - PILOT IN COMMAND
7. (C) SPATIAL DISORIENTATION - PILOT IN COMMAND

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

Factual Information

HISTORY OF FLIGHT

On January 18, 1995, about 1805 eastern standard time, an Agusta A109C, N1WD, owned by Leffler Transportation Company and piloted by Charles E. Baird, was destroyed when it impacted in an open field near the Deck Airport, Jackson Township, Pennsylvania. The pilot and both company employee passengers were fatally injured. Instrument meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed for the flight conducted under 14 CFR Part 91.

The flight originated from a company helipad (PS96) in Richland, Pennsylvania, about 1300. The first destination was a helipad located 1 1/2 miles west of Williamsport, Pennsylvania, to pick-up company personnel. During this IFR flight, N1WD was given a clearance direct to the Picture Rocks Radio Beacon (PIX) to conduct the ILS approach to the Williamsport-Lycoming Airport (IPT). According to Air Traffic Control records, N1WD turned away from PIX during the approach, and the pilot complained of a bad signal from the radio beacon. A vector was provided back towards PIX by the New York Air Route Traffic Control Center (ARTCC), and N1WD resumed it's own navigation.

At 1333, N1WD flew over PIX and began the instrument procedure turn. New York ARTCC terminated radar services and instructed N1WD to contact the IPT tower. Five minutes later, N1WD reported crossing PIX inbound to New York ARTCC, and was told again to contact IPT tower. The pilot contacted the tower and continued the approach without further incident. At the completion of the approach, the helicopter proceeded to a helipad, west of IPT.

The Williamsport Automated Flight Service Station (AFSS) received a telephone call from the pilot of N1WD, at 1613. The pilot filed an IFR flight plan for a return flight from IPT to PS96, and received an update on the current weather conditions at the Reading, Lancaster, and Harrisburg-Olmstead Airports.

The IPT tower received a radio call, at 1707, from the pilot of N1WD. He stated that he was at a helipad 1 1/2 miles west of IPT, and was ready to depart under VFR conditions. The pilot stated that he would obtain his IFR clearance directly from New York ARTCC by radio when airborne. At 1709, N1WD contacted New York ARTCC and requested an IFR clearance. When the New York controller asked if he could climb to 4,000 feet under VFR conditions, the pilot advised ARTCC that 1,800 feet was the highest he could climb. The New York controller then informed N1WD that he could not issue an IFR clearance, and the pilot stated he would return to IPT to "pick it up."

After returning to IPT, N1WD received an IFR clearance from the tower and departed, at

1727. The pilot contacted New York ARTCC and was cleared to 6,000 feet. New York established radar contact with N1WD and issued a frequency change to Harrisburg (MDT) Approach Control.

After initial contact with N1WD, the Harrisburg (MDT) controller asked what his on course heading was to his "landing site." The pilot replied with "on course is about...150 I guess," and further stated that he was currently flying a heading of 180 degrees. The controller then inquired if N1WD was navigating direct to the "site" via Loran navigation. The pilot stated, "Ah yes Sir, and ah if we could go direct down to Ravine [VOR], we'll take that, and ah we could try the Deck approach."

The MDT controller transmitted, at 1745:29, "Ok, one whiskey delta, understand you want to do the approach to Deck--ah proceed direct Ravine, plan the VOR approach to the Deck Airport, altimeter three zero two zero."

The reply from N1WD was, "Three zero two seven, direct Ravine, one whiskey delta."

After a frequency change to another MDT controller, the pilot was issued a clearance for the VOR/DME Alpha approach to the Deck airport. The pilot reported, at 1756:44, "One whiskey delta's VOR inbound."

The MDT controller stated, at 1756:47, "Copter one whiskey delta, roger radar service terminated, frequency change to advisory approved forward your cancellation via the telephone as soon as feasible after landing."

At 1756:54, N1WD replied, "One whiskey delta." This was the last transmission received from N1WD.

In a written statement, the MDT Controller said, "...The aircraft was approximately 3 NM northwest of 9D4, on the approach course. Over the next few minutes I observed what appeared to be normal completion of that approach. Target went into coast track at some altitude below about 700 feet MSL, at which point radar contact was lost..."

A set of parallel railroad tracks ran east and west near 9D4. The Leffler Helipad (PS96) was located about 3 miles east of the airport, along the railroad tracks. A witness, midway between the airport and PS96, reported seeing a helicopter, about 1750, proceeding west along the railroad tracks at approximately 150 feet above ground level. The helicopter circled the witness's barn once, then proceeded west along the railroad tracks at a high rate of speed. The witness estimated the cloud base to be about 400 feet.

About 1800, a witness, approximately 2/10 of a mile northwest of 9D4, reported a helicopter circled over his house. He observed the helicopter depart to the northwest at about 200 feet AGL, and lost sight of it when, "He [the helicopter] then flew into a dense cloud."

Two other witnesses, about a mile northwest of the airport, heard a helicopter circle overhead, after 1800. One of the witnesses stated that when the helicopter flew overhead, it was in the clouds and he could not see it. This witness, and the witness near 9D4, both observed the helicopter descend out of the clouds in a steep descent, and impact the ground. The helicopter struck the ground about 3/4 mile northwest of 9D4, in the vicinity of the VOR/DME Alpha instrument final approach course.

The accident occurred during the hours of darkness, about 40 degrees, 21 minutes north latitude, and 76 degrees, 20 minutes west longitude.

PERSONNEL INFORMATION

The pilot, Mr. Charles E. Baird, held a Commercial Pilot Certificate with ratings for airplane single and multi-engine land, rotorcraft helicopter, and instrument airplane and helicopter.

His most recent Federal Aviation Administration (FAA) Second Class Medical Certificate was issued on May 11, 1994.

Mr. Baird's current pilot log book was not located. Mr. Baird's total flight time was estimated to be about 11,000 hours, of which approximately 250 hours were in this make and model helicopter. Instrument currency could not be determined.

Mr. Baird completed his initial Agusta 109 qualification training during June 1993, with the Agusta Training Department in Philadelphia, Pennsylvania. He also completed a 2 day Pilot Recurrent Ground Course for the A109C, on October 12, 1994.

AERODROME INFORMATION

The Decks Airport was located on a valley floor, that ran northeast/southwest. The airport elevation was 520 feet above mean sea level. The valley was about 15 miles wide, with hills ranging from 1,000 feet to 1,800 feet high on both sides.

The single paved runway was 01/19, and had pilot controlled lighting installed. To activate the lights the pilot had to key the aircraft radio on the Unicom frequency of 122.8, 7 times in 7 seconds. When tested, the lights activated.

METEOROLOGICAL INFORMATION

There was no weather reporting facility at the Decks Airport.

Weather reported at local airports was as follows:

Harrisburg (MDT), 21 miles southwest of Decks. At 1750, ceiling indefinite 600 foot sky obscured, visibility 2 miles with light drizzle and fog. Temperature 44 F, dewpoint 44 F, and the

winds from 090 degrees at 7 knots.

Lancaster (LNS), 14 miles south of Decks. At 1750, ceiling measured 700 foot overcast, visibility 2 miles with light rain and fog. Temperature 43 F, dewpoint 41 F, and the winds from 090 degrees at 6 knots.

Reading (RDG), 16 miles east of Decks. At 1750, partial obscuration, ceiling measured 900 foot overcast, visibility 2 with fog. Temperature 46 F, dewpoint 41 F, and the winds from 360 degrees at 6 knots.

AIRCRAFT INFORMATION

The helicopter was approved for single pilot, VFR and IFR land operation, under day and night, during non-icing conditions.

WRECKAGE AND IMPACT INFORMATION

The helicopter wreckage was examined at the accident site, on January 19 and 20, 1995. The examination revealed that all major components of the helicopter were accounted for at the scene.

The helicopter was contained in an impact hole about 12 feet in diameter, and was destroyed during impact and post crash fire. The major components above ground level were; the last 12 feet of the tail boom, with the tail rotor gear box, hub, and blades; one main rotor blade standing vertical from the impact hole, attached to the main rotor hub; and both main landing wheels.

Debris within 50 feet of the wreckage hole included; the pilot's door, windshield fragments, numerous layers of composite material from the main rotor blades, and a briefcase. The debris was located on the southeast side of the hole, and the scatter path indicated a magnetic bearing of 150 degrees.

The extended main landing wheels were imbedded in the ground, on the west side of the impact hole. The main rotor hub and transmission were imbedded on the east side of the wreckage hole.

The distance between the top of the main rotor hub and the landing wheels was about 11 feet. The alignment of wheels and transmission indicated a magnetic bearing of 060 degrees.

The main transmission and both engines were removed from the impact hole for further examination.

One main rotor blade attached to the hub was standing vertically above ground and was missing about the last 3 feet of the blade tip, which was located about 350 feet northwest of

the main wreckage. The next blade in rotation was also attached to the hub and was horizontal to, and imbedded in, the ground. The third blade in rotation was separated from the blade root and was imbedded in the ground parallel to the second blade. The fourth blade in rotation was broken and bent at its root. This blade was imbedded in the ground parallel to the second and third blades. The three blades imbedded in the ground were on a magnetic bearing 150 degrees from the main rotor hub. No ground scars were visible on the northwest side of the main rotor hub, beyond the impact hole.

The tail boom was laying on its left side, with the aft end of the tail pointing in a magnetic direction of 360 degrees. The left and right horizontal stabilizers remained attached to the tail boom. The right horizontal stabilizer was mud-splattered, but undamaged. The left horizontal stabilizer sheet metal was bent, ripped, and compressed inward towards the fuselage. The horizontal stabilizers moved up and down freely, and remained connected to the stabilizer push-pull tube inside of the tail boom.

The lower vertical stabilizer was intact and undamaged. The upper vertical stabilizer was intact. The top of the stabilizer was imbedded 2 to 3 inches in the ground and bent.

The open end of the tail boom was burned in the vicinity of the points of separation. The four corners of the tail boom were burned, and the structural metal was curved downward. The tail rotor drive shaft was separated at the tail boom opening and displayed rotational twisting at the point of separation.

The tail rotor gear box was located on the ground below its normal point of attachment to the tail boom. The tail rotor blades and hub assembly were separated from the gear box and were directly below the damaged left horizontal stabilizer. Both blades were attached to the hub and displayed similar bending. The tip of one blade was separated.

Excavation of the impact hole revealed helicopter components buried 7 feet down in the ground. The dual torque meter and caution panel section indicators, with light bulbs, were removed from the wreckage for further examination.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on Mr. Charles Baird, on January 19, 1995, by Dr. Robert M. Kline, of the Lebanon County Coroner's Office, Lebanon, Pennsylvania.

The toxicological testing report, from the Armed Forces Institute of Pathology, Washington, DC., was negative for drugs and alcohol for Mr. Charles Baird.

TESTS AND RESEARCH

Engine Tear Down

On February 23 and 24, 1995, the number one and two engines were disassembled at the Airwork Facility, Millville, New Jersey. The NTSB IIC and the parties to the investigation were present during the examination. The damage to both engines was extensive, and neither engine was capable of a test run.

The examination of the number one and two engines revealed the presence of oil in both accessory gear cases, and bearing lubrication throughout both engines. Three of the four chip detector plugs examined were free of debris. The lower chip plug of the number one engine was missing.

The compressor blades of both engines were either broken or, displayed evidence of bending and rubbing. The compressor case liners of both engines displayed rotational rubbing. The compressor spur adapter gearshafts were sheared in the number one and two engines. The turbine to compressor coupling shafts of both engines were sheared.

Main Gear Box, Components and Systems Examination

On February 21, 1995, the main gear box (MGB) and airframe components were examined at the Agusta Aerospace Facility, Philadelphia, Pennsylvania. The NTSB IIC and the Agusta party representative were present during the examination.

No pre-impact failures were noted during examination of the main rotor hub. All severed control rods and rod ends displayed bending near their separation points.

The internal components of the MGB were intact and lubricated. There was no evidence of internal failure. Examination of the chip detector plug and oil filter revealed no debris. The number one and two engine input sections of the MGB displayed forward crushing. Both inputs were frozen and could not be rotated. The number one and two engine Thomas couplings, that connected the engines to the MGB, displayed rotational scratches and torsional twisting. When the tail rotor output shaft of the MGB was rotated by hand, the main drive to the internal sun gear rotated freely.

The number two hydraulic pump was removed from the MGB. The pump drive shaft was not sheared and turned freely. The number one hydraulic pump was partially separated from the MGB and was removed from the case. The pump drive shaft was not sheared; however, the shaft was difficult to turn by hand.

Three of the four hydraulic filter by-pass buttons, from the number one and two hydraulic systems, remained retracted. The return filter button from the number one system was extended and bent. Examination of the four hydraulic filters revealed no debris or metal particles.

The number two engine airframe oil filter by-pass button was extended. Examination revealed the filter was fire damaged inside and out.

The tail rotor gear box input shaft turned freely when rotated by hand, and drove the output shaft. The tail rotor flap bearing would not rotate. When disassembled, the axle was observed to be bent in a "U" shape.

ADDITIONAL INFORMATION

Light Bulbs

Investigation revealed N1WD was not equipped with the optional engine fire extinguishing system that used these indicators.

Company Operations

The Company Operations Specifications were reviewed. They revealed that except when necessary for take-off and landing, the following apply to operations under VFR conditions: "There will be no operations unless the visibility is at least 1/2 mile by day or 1 mile at night, at an altitude of 1,200 feet or less in uncontrolled airspace."

There is no published instrument approach procedure to PS96 in Richland, Pennsylvania.

Spatial Disorientation

According to the Headquarters, Department of the Army Field Manual, Aeromedical Training for Flight Personnel, it stated:

"Spatial Disorientation is an individual's inaccurate perception of position, attitude, and motion relative to the center of the earth. When it occurs, pilots are unable to see, believe, interpret, or process the information on the flight instruments. Instead, they rely on the false information their senses provide."

Wreckage Release

The majority of the wreckage was released on January 20, 1995, to Kyle D. Moore, a representative of the owners insurance company. The remainder or the wreckage was signed for by Mr. Moore on May 3, 1995.

Pilot Information

Certificate:	Commercial	**Age:**	57,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**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:**	Yes
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	May 11, 1994
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	11000 hours (Total, all aircraft), 250 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	AGUSTA	**Registration:**	N1WD
Model/Series:	A109C A109C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	7601
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	October 16, 1994 100 hour	**Certified Max Gross Wt.:**	5997 lbs
Time Since Last Inspection:	73 Hrs	**Engines:**	2 Turbo shaft
Airframe Total Time:	1300 Hrs	**Engine Manufacturer:**	ALLISON
ELT:	Installed, not activated	**Engine Model/Series:**	250-C20R/1
Registered Owner:	LEFFLER TRANSPORTATION COMPANY	**Rated Power:**	450 Horsepower
Operator:		**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	MDT ,310 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	17:50 Local	**Direction from Accident Site:**	240°
Lowest Cloud Condition:	Unknown	**Visibility**	2 miles
Lowest Ceiling:	600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	6 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	90°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	6°C / 6°C
Precipitation and Obscuration:	N/A - None - Fog		
Departure Point:	WILLIAMSPORT , PA (IPT)	**Type of Flight Plan Filed:**	IFR
Destination:	RICHLAND , PA (PS96)	**Type of Clearance:**	IFR
Departure Time:	17:27 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	MYERSTOWN/DECKS 9D4	**Runway Surface Type:**	
Airport Elevation:	520 ft msl	**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	VOR/DME
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	40.340599,-76.419906(est)

Administrative Information

Investigator In Charge (IIC):	Pearce, Robert
Additional Participating Persons:	HOWARD E GUNTER; HARRISBURG , PA PAOLO FERRERI; PHILADELPHIA , PA SCOTT S SCHEURICH; INDIANAPOLIS , IN
Original Publish Date:	July 31, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=38848