Aviation Investigation Final Report

Location:	GREENFIELD, Indiana	**Accident Number:**	CHI97FA093
Date & Time:	March 27, 1997, 13:38 Local	**Registration:**	N97120
Aircraft:	Stinson 108	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

After takeoff, witnesses observed the airplane's engine sputter at approximately 200 feet over the departure end of the runway. The airplane banked 40 to 90 degrees to the left and stalled. The pilot had an engine loss two weeks prior to this accident during which he flew the airplane back to the runway and landed on a taxiway. Subsequence examination of the engine revealed stuck exhaust valves on number six and number one cylinders. Both ignition harnesses had numerous cracks in the ground shielding, with electrical tape over some of the cracks. Three new ignition harnesses had been installed with no maintenance entry in the engine logbook. The remaining ignition harnesses appeared to be the originals.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: a loss of engine power due to restricted movement in the exhaust valve and rotted/weathered ignition harness, and the pilot's failure to maintain airspeed which resulted in an inadvertant stall.

Findings

Occurrence #1: LOSS OF ENGINE POWER(PARTIAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) ENGINE ASSEMBLY,VALVE,EXHAUST - MOVEMENT RESTRICTED

2. (C) IGNITION SYSTEM,IGNITION HARNESS - ROTTED/WEATHERED

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY LANDING AFTER TAKEOFF

Occurrence #3: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING - TURN TO LANDING AREA (EMERGENCY)

Findings
3. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
4. STALL - INADVERTENT - PILOT IN COMMAND

Occurrence #4: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On March 27, 1997, at 1338 eastern standard time (est), a Stinson 108, N97120, owned and operated by a private pilot, was destroyed by post-crash fire during a forced landing attempt while maneuvering to return to the airport. The airplane experienced a loss of engine power shortly after takeoff from runway 18 (2,000' x 150' dry/turf), at Pope Airport, Greenfield, Indianapolis. The pilot sustained fatal injuries. No flight plan was on file for the 14 CFR Part 91 flight. The local flight was operating in visual meteorological conditions. The flight departed from Greenfield, Indiana, en route to Greenwood, Indiana, at 1335 est.

The Indiana State Police interviewed the pilot's Certified Flight Instructor who was an eyewitness to the accident. The witness said the pilot had flown in to talk with him and did not mention any problems with his airplane. The pilot then taxied his airplane to the north end of the airport. The pilot departed runway 18, and then the witness heard the engine sputter. He looked up and saw the airplane at approximately 200 feet above ground level (AGL) over the extreme south end of the runway. The airplane turned to the east as the engine began to run again. The witness heard the engine sputter again. The airplane continued to turn left and was facing west when it stalled. The airplane was observed going into the ground left wing low, and nose first.

There were several other witnesses who observed the accident. The witnesses were interviewed by the Indiana State Police. The first witness was standing in a hangar on the south end of the runway and heard the airplane's engine sputter. The witness then saw the airplane flying northbound at 200 feet AGL in a 30 to 40 degree left bank. He observed the airplane bank even steeper and then it nosed down. The witness said that the engine was running when the impact occurred. The second witness said the airplane appeared to be higher in altitude than most airplanes that he observed taking off from Pope Field. He said the airplane then made a sharp turn to the left and continued to turn, banking to almost 90 degrees. The airplane at that point was facing northbound and then dropped sharply. The witness then lost sight of the airplane and could not tell if the engine was running. The third witness said he heard the airplane's engine sputtering but never observed the airplane. This witness said at times the engine was barely running. He said the engine continued to sputter until he heard the airplane crash.

A Federal Aviation Administration (FAA) Principal Operation Inspector (POI) interviewed the pilot's son who said that his father had made an emergency landing at the Greenwood Airport on March 1, 1997. The airplane lost power and his father landed on the taxiway at Greenwood Airport. This was also confirmed by the Manager of Greenwood Airport. Sometime after this incident, the pilot borrowed a compression gauge, but the airplane was not checked by an

Airframe and Powerplant (A&P) mechanic.

A FAA Principal Maintenance Inspector (PMI), interviewed the A&P Mechanic who performed the Annual Inspection on September 11, 1996, and he said there were no undue problems noted. He also said that the pilot received an STC for auto gas in February, 1997, and was known to use five gallon plastic gas cans for filling his airplane. The A&P also added that the pilot performed some of his own maintenance, and would ask the A&P for advice if he was not sure of the maintenance to be performed.

PERSONNEL INFORMATION

The pilot was born September 18, 1935. He was the holder of a private certificate with an airplane single engine land rating. He also held a third class medical issued on October 10, 1995. A review of the pilot's last logbook revealed his most recent biennial flight review was on March 21, 1997. He had accumulated a total of 1,356 hours of flight time, 45 of which were in a Stinson 108 airplane.

AIRCRAFT INFORMATION

The airplane was a Stinson 108, serial number 108-1120, N97120. The airplane had accumulated 1,272 hours time in service at the time of the accident. The engine had 1,272 hours total with 132 hours since its last overhaul. The most recent inspection was conducted on September 11, 1996, 38 hours prior to the accident.

WRECKAGE AND IMPACT INFORMATION

The NTSB on-scene investigation began at 0800 on March 28, 1997. The wreckage was located 200 yards to the east of the threshold to runway 36 at Pope Airport, Greenfield, Indiana, in a soybean field. A post crash fire engulfed the airplane.

The fuselage was discovered laying on its belly in the upright position. There was a smell similar to that of auto fuel around the wreckage site. The occupiable space in both the front and rear seating areas was compromised. The upper and lower longerons and control cables were cut to expedite removal of the pilot. A post crash fire had destroyed all of the fuselage skin and melted the inboard section of the wings. There was one ground scar located 6 feet to the southwest of the main wreckage that measured 34 feet long with a 4 foot diameter crater in the middle, approximately the same length as the airplane's wing span. The crater was approximately two feet deep with compressed dirt at the bottom of the crater, and was approximately the same size and width as the propeller.

The right wing had chordwise compresison impact damage along the full span. The right aileron and flap were destroyed by the post crash fire. The right fuel tank was ruptured. The right wing remained partially attached to the fuselage. The right landing gear was partially separated from the fuselage and right wing strut assembly.

The horizontal stabilator received post crash fire damage. Hinge points and stop bolts were found undamaged and in place. Both control cables were found secure and in place. The stabilator trim drum showed an actuator extension of approximately a neutral trim tab setting. The vertical stabilizer was still secured to the fuselage mountings. All rudder hinge points and stop bolts were intact, and both control cables were in place and secure.

The outboard section of the left wing exhibited leading edge compression damage. The left aileron was found in position, but damaged due to the post crash fire. The left flap was destroyed by fire damage. The left wing was founded partially attached to the fuselage. The left fuel tank was ruptured. The left main landing gear was damaged by post crash fire and had partially separated from both the wing strut and fuselage.

All of the instrument panel and controls were destroyed. The flap handle appeared to be in the flaps up position. The engine fuel primer was found in the unlocked position. The fuel selector valve was recovered in the left tank position. The gascolator contained a brown color substance, with the greenest portion at the center, approximately one centimeter in diameter or about the same size as the outlet fuel diameter. Examination of the carburetor revealed a black liquid similar to that of oil in the bottom of the carburetor bowl. Removal of the main carburetor jet revealed small metal chips both metallic and non- metallic. The directional gyro and horizontal gyro were recovered. Both internal gyro wheels were undamaged. All other instruments were destroyed beyond recognition.

A continuity check of the flight control systems was completed with no pre-impact discrepancies noted. The engine was examined and partially disassembled on March 28, 1997. The engine was turned by way of the propeller and continuity was established through all pistons and the accessory section. A compression leak around the exhaust valves on number six and number one cylinders was noted. The accessory housing was broken. The left and right magnetos were removed for further examination. The upper spark plug to the number six cylinder appeared new with no signs of combustion residue on the insulated surface, while the lower spark plug was fouled with carbon deposits. All spark plugs threads in the cylinder head had heli-coil inserts. The propeller was intact. One of the propeller blades was slightly bend aft at the hub with no nicks or scratches noted on either of the two blades.

MEDICAL AND PATHOLOGICAL INFORMATION

A post mortem examination of the pilot was conducted on March 28, 1997 at Indiana University School of Medicine, Indiana. No pre-existent anomalies were noted during this examination which contributed to the accident or the pilot's death.

The pilot's toxicological analysis was performed by the FAA's Civil Medical Institute in Oklahoma City, Oklahoma. The toxicological examination of specimens from the pilot detected 7.700 (ug/ml, ug/g) salicylate in the urine. Salicylate is a by- product of aspirin according to Tabor's Cyclopedic Medical Dictionary.

TESTS AND RESEARCH

The magnetos were removed and tested at Aircraft Systems, Inc., on May 8, 1997. The test of the right and left magneto revealed no discrepancies. The right and left magneto harness failed the test due to the post crash fire. Both harnesses had numerous cracks in the ground shielding, with electrical tape over some of the cracks in the number five top wire on the right magneto, and the number four top wire harness on the left magneto. The right magneto had a new number three and number four cylinder wire harness installed with no entry in the maintenance logbook. The left magneto had a new number one cylinder wire harness installed with no maintenance entry in the engine logbook.

ADDITIONAL DATA

Parties to the investigation were the Federal Aviation Administration.

Following the on-scene portion of the investigation, the wreckage was released to the pilot's son, on March 28, 1997.

Pilot Information

Certificate:	Private	**Age:**	61,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	July 10, 1995
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	1356 hours (Total, all aircraft), 45 hours (Total, this make and model), 1356 hours (Pilot In Command, all aircraft), 8 hours (Last 90 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Stinson	**Registration:**	N97120
Model/Series:	108 108	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	108-1120
Landing Gear Type:	Tailwheel	**Seats:**	4
Date/Type of Last Inspection:	September 11, 1996 100 hour	**Certified Max Gross Wt.:**	2000 lbs
Time Since Last Inspection:	94 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1272 Hrs	**Engine Manufacturer:**	Franklin
ELT:	Not installed	**Engine Model/Series:**	6A4-150-B3
Registered Owner:	RICHARD EUGENE HOFMANN	**Rated Power:**	150 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	IND ,797 ft msl	**Distance from Accident Site:**	28 Nautical Miles
Observation Time:	12:56 Local	**Direction from Accident Site:**	80°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	12 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	240°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	19°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(GFD)	**Type of Flight Plan Filed:**	None
Destination:	GREENWOOD , IN (5I1)	**Type of Clearance:**	None
Departure Time:	13:35 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	POPE FIELD GFD	**Runway Surface Type:**	Grass/turf
Airport Elevation:	895 ft msl	**Runway Surface Condition:**	Dry;Rough
Runway Used:	18	**IFR Approach:**	None
Runway Length/Width:	2000 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	39.789909,-85.770812(est)

Administrative Information

Investigator In Charge (IIC):	Carlson, Todd
Additional Participating Persons:	JOHN L HENDERSON; INDIANAPOLIS , IN ROBERT G JUSTESEN; INDIANAPOLIS , IN
Original Publish Date:	April 10, 1998
Last Revision Date:	
Investigation Class:	Class
Note:	
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