Aviation Investigation Final Report

Location:	Henderson, Nevada	**Accident Number:**	LAX01FA011
Date & Time:	October 13, 2000, 10:34 Local	**Registration:**	N2434T
Aircraft:	Navion G	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The aircraft collided with the ground in a near vertical nose down descent during an attempted return-to-runway maneuver in the takeoff initial climb. The airplane taxied from parking at the terminal building to runway 36 and took off without a clearance from ground or local control. Both controllers attempted to stop the airplane by using a red light gun signal control; however, the airplane did not stop. The controllers did not see the airplane stop in the run-up area. Other witnesses, including an FAA airworthiness inspector reported that just beyond the departure end of the 5,000-foot-long runway, the airplane began a tight left turn, as if attempting to return to the runway. The left bank continued to increase until the nose dropped and the airplane descended vertically to ground impact, about 1,000 feet from the approach end of runway 18. The FAA inspector saw a trail of smoke coming from the airplane during the initial climb. The pilot ordered the fuel about 1 hour prior to takeoff and supervised the process; 15 gallons were put in each tip tank and none was added to the main tank. No determination could be made as to the quantity in the main tank at departure. The pilot pointed out two empty oil cans laying on the ground by the airplane's nose and asked the refueler if he could throw them away for him. The refueler did not observe the pilot placing the oil in the engine or complete any other aspect of a preflight inspection. The pilot, who is an A & P, performed all maintenance activities on the aircraft. Notations in the maintenance records show an unresolved 1-pint per hour oil consumption rate over the last 10 months. The pilot's personal flight logbook reflected that between 1989 and the date of the accident, the pilot had flown 100 hours total, all in the accident airplane. The most recent 6 months of activity consisted of three flights in April, two flights in May, and two flights in July. The aircraft fuel system consists of a main fuselage tank (which extends into the root area of each wing), and a left and right tip tank. The main tank has a capacity of 39 gallons, and each tip tank has a 34-gallon capacity. The normal operating procedures section of the pilot operating handbook states that for starting, takeoff and climb, the fuel selector should be selected to the main tank, and that the electric fuel boost pump be used for takeoff and when switching fuel tanks. No hydraulic deformation was noted to the ruptured main fuel tank, and no fuel was found in the

tank. The vent lines and ports for all three fuel tanks were clear and unobstructed. The fuel selector was visually examined by looking in the ports for each of the tanks. The ball cock opening was found positioned between the main tank and the left tip tank; the opening was about 40 percent open to the left tip and about 10 percent open to the main tank. The electric fuel boost pump switch was in the OFF position. The fuel gages showed 3/4 full for both tip tanks and 9 gallons for the main tank. The avionics master switch was in the OFF position. The No. 1 communications radio was selected to 125.1 (the local control frequency), while the No. 2 communications radio was on 121.1. For the audio control panel, the transmitter was selected to the No. 1 communications radio and the speaker was selected to the No. 2 communications radio. Borescope examination of the cylinder interiors revealed deposits of rust on the cylinder walls. No other preimpact anomaly was found during an examination of the engine or the airframe systems.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's failure to maintain an adequate airspeed while maneuvering to return to the runway following a loss of engine power in the takeoff initial climb. The loss of power was probably due to the pilot's failure to ensure that an adequate fuel supply existed in the main tank prior to departure, and, his failure to ensure that the fuel boost pump was turned on.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - NONMECHANICAL
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) FLUID,FUEL - STARVATION
2. (C) FUEL SUPPLY - NOT VERIFIED - PILOT IN COMMAND
3. (C) FUEL BOOST PUMP SELECTOR POSITION - IMPROPER - PILOT IN COMMAND

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
4. (C) AIRSPEED - NOT MAINTAINED - PILOT IN COMMAND
5. (C) STALL/SPIN - ENCOUNTERED - PILOT IN COMMAND

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

Factual Information

HISTORY OF FLIGHT

On October 13, 2000, at 1034 hours Pacific daylight time, a Navion G, N2434T, collided with the ground during an attempted return-to-runway maneuver in the takeoff initial climb at the Henderson, Nevada, airport. The airplane was owned and operated by the pilot under 14 CFR Part 91 of the Federal Aviation Regulations. The airplane was destroyed in the accident sequence and the private pilot, the sole occupant, sustained fatal injuries. Visual meteorological conditions prevailed and included variable winds at 4 knots. The personal flight was originating at the time of the occurrence and was destined for Bakersfield, California.

According to statements from controllers in the non-federal air traffic control tower at the Henderson airport, the airplane taxied from parking at the terminal building to runway 36 and took off without a clearance from ground or local control. Both controllers attempted to stop the airplane by using a red light gun signal control; however, the airplane did not stop. The controllers did not see the airplane stop in the run-up area.

In addition to the controllers, four ground witnesses, including a Federal Aviation Administration (FAA) airworthiness inspector from the Las Vegas Flight Standards District Office, observed the accident sequence. The witnesses reported that just beyond the departure end of the 5,000-foot-long runway, the airplane began a tight left turn, as if attempting to return to the runway. The left bank continued to increase until the nose dropped and the airplane descended vertically to ground impact, about 1,000 feet from the approach end of runway 18. The witnesses said the nose was almost 90 degrees to the horizon when it impacted the ground. The FAA inspector stated that he observed a trail of smoke coming from the airplane during the initial climb.

The airport technician who refueled the airplane was interviewed on October 13. He stated that the pilot ordered the fuel about 1-hour prior to takeoff and was present during the fueling process. The pilot removed and replaced the fuel caps himself. The initial fueling order from the pilot was for 10 gallons in each tip tank, and, during the fueling, he changed the order to 15 gallons in each tip tank. The pilot pointed out two empty oil cans laying on the ground by the airplane's nose and asked the refueler if he could throw them away for him. The refueler did not observe the pilot placing the oil in the engine or complete any other aspect of a preflight inspection. According to the refueler, the pilot had a normal demeanor.

Other airport employees were interviewed who were present when the pilot arrived on Tuesday, October 10, and when he paid for his fuel just prior to departure. According to their statements, when the pilot arrived on October 10 he was very agitated and upset, and told the

employees that he had violated the Las Vegas Class B airspace on his way to Henderson. On the morning of the accident, the pilot had a normal demeanor.

PERSONNEL INFORMATION

The pilot's airman and medical records files in the FAA Airman and Medical Certification Branches in Oklahoma City, Oklahoma, were reviewed. In addition, a personal flight logbook covering the period from March 5, 1989, to the accident was examined.

According to the FAA records, the pilot held a private pilot certificate, with airplane ratings for single engine land and sea. The most recent issuance of the certificate was dated December 13, 1958. He held a third-class medical certificate issued March 14, 2000, without limitations. He also held a mechanic certificate with airframe and powerplant ratings, which was issued June 19, 1995.

The personal flight logbook began on March 5, 1989, when the pilot purchased the accident airplane. The log reflected a total time as of the accident of 1,060 hours. Between the first entry in 1989 and the date of the accident, the pilot had accrued about 100 hours total, all in the accident airplane. The most recent 6 months of activity consisted of three flights in April, two flights in May, and two flights in July. The last entry in the record is dated July 22, 2000. The log record noted that a biennial flight review was accomplished on February 3, 1999.

AIRCRAFT INFORMATION

The Navion Aircraft model G, serial number 4-2434, was manufactured in April 1962. According the aircraft maintenance records and the recording tachometer in the cockpit, it had accumulated a total time in service of 1,857 hours. The most recent annual inspection was recorded as completed on April 3, 2000, 14 hours prior to the accident. Examination of the airframe log entries disclosed that from November 1995 to March 29, 2000, the pilot performed all maintenance activities on the aircraft. The annual inspection on April 3 was accomplished by another individual with an FAA Inspection Authorization.

According to the maintenance records, the Continental IO-470-H engine, serial number 87083-2, was the original Navion factory installation in the airframe and had accumulated a total time equal to that recorded for the airframe. The engine logbook does not reflect the accomplishment of a 100-hour inspection or sign-off coinciding with the annual inspection recorded in the airframe record.

Review of the airframe and engine logbook record entries disclosed that the pilot entered discrepancies in the remarks column of the flight record page. The only unresolved discrepancies found in either record were the notation of a 1-pint per hour oil consumption rate, which is listed in entries dated January 11 and March 29, 2000.

The aircraft fuel system consists of a main fuselage tank (which extends into the root area of

each wing) and a left and right tip tank. The main tank has a capacity of 39 gallons, and each tip tank has a 34-gallon capacity. Section 2 of the Navion Aircraft owners manual for the model G contains normal operating procedures. The paragraphs dealing with starting, takeoff, and climb all state that the fuel selector should be selected to the main tank for these operations, and that the electric fuel boost pump be used for takeoff and when switching fuel tanks.

Examination of refueling records at the Henderson Executive Airport disclosed that the airplane was last fueled about 1-hour prior to takeoff with the addition of 15-gallons of 100LL aviation gasoline to each tip tank. According to the refueling technician, the pilot was present during the fueling process and removed and replaced the fuel caps himself. No fuel was added to the fuselage tank and investigators could not make an independent determination on the quantity it may have contained.

There were no reported problems with any aircraft fueled before or after the accident aircraft.

METEOROLOGICAL INFORMATION

The closest official aviation weather observation station is the McCarran International Airport, which is located 8 miles north northwest of the Henderson airport. The 1056 METAR for McCarran was reporting in part, clear skies with a 10 mile visibility and variable winds at 4 knots. The 0956 observation was reporting similar sky and visibility conditions with calm winds. No unusual meteorological phenomena were observed by any witness to the accident.

COMMUNICATIONS

The non-federal control tower at the Henderson airport uses a VHF frequency of 125.1 for local control, and 127.8 for ground control. In addition, the airport has a UNICOM frequency of 122.95, which is monitored by the airport operations personnel. Certified re-recordings of the local and ground control frequencies were obtained from the tower and reviewed. No transmissions identified as coming from the accident aircraft were heard during the tape review. The individual in airport operations who was monitoring the UNICOM frequency stated that no transmissions were heard from the accident aircraft.

AERODROME INFORMATION

At an elevation of 2,458 feet msl, the Henderson Executive Airport has one runway that is oriented on a 360-180 magnetic bearing. The asphalt surfaced runway is 5,060 feet long by 60 feet wide. The terrain surrounding the airport is flat open desert, with no obstructions to the approach or departure ends of either runway.

WRECKAGE AND IMPACT INFORMATION

The accident site is on the Henderson airport property, about 1,000 feet from the approach end

of runway 18, and roughly on the extended runway centerline. The terrain is largely flat with vegetation characteristic of the southern Nevada desert. The impact site is in an area used by the airport to control water run-off and is composed of soil covered by rocks up to 8 inches in diameter, arranged in alternating swales with an average depth of 2 feet. The aircraft nose was pointing to the west.

The nose and both wings were extensively crushed and accordioned rearward, with the folds of the crush lines about 70 degrees to the longitudinal axis. The crush lines were also aligned 30 degrees to the lateral axis, with the more rearward accordioning on the right side of the cabin. The rearward accordioning of the nose extends back to the rear of the front seats, with compression buckling noted to the empennage from the aft cabin limit to almost the leading edge of the horizontal stabilizers. A diagonal crush line was apparent on the right wing, tip leading edge to trailing edge, with about a 30-degree angle to the lateral axis.

The right wing tip tank was crushed, with the folds matching the fuselage deformation. The tank was ruptured, with no fuel remaining. The aileron and flap were attached to their hinge and hangar assemblies, with the flap visually in the up position. Control cable continuity was established from the wing root to the aileron bellcrank. The bellcrank to aileron push-pull tube exhibited a fracture of the tube at the aileron rod end fitting; the fracture face displayed 45-degree shear lips with a granular surface.

The left wing tip tank was crushed and disrupted, with no fuel remaining in the tank. The outboard 1/2 span was accordioned rearward with angles matching the fuselage crush lines. The flap and aileron remained attached to the wing and control continuity was established from the root to the aileron. The flap was visually in the up position.

There were no deposits of oil on the fuselage bottom or sides. No oil spray was found anywhere in the engine compartment.

All three landing gear were in the retracted positions inside their respective wheel wells.

The fixed and moveable empennage control surfaces remained attached to the fuselage and were undamaged. The mass balance weights were present. Control continuity was established from the empennage controls to an area beneath the cockpit floor just forward of the front seats, where the cables were trapped in the crush folds. The cables were observed from this crushed area up to the cockpit control wheels.

The main fuel tank was ruptured along a longitudinal seam with no hydraulic deformation apparent. No fuel was found in the tank.

The pilot's seat locking pin was bent in an aft direction and one locking hole in the seat floor rail was gouged and elongated.

One propeller blade remained in the hub and was without leading edge damage or cordwise

striations; the blade was bent in a smooth curve toward the face side by about 10 degrees. The second blade had broken out of the hub and was under the nose. This blade exhibited leading edge nicks, cordwise striations, and a leading edge tip end twist opposite the cambered side.

The vent lines and ports for all three fuel tanks were clear and unobstructed. The fuel selector was cut out of the extensively crushed cockpit structure for examination. Prior to removal, the fuel lines leading to the selector were identified and marked. The selector was visually examined by looking in the ports for each of the tanks. The ball cock opening was found positioned between the main tank and the left tip tank; the opening was about 40 percent open to the left tip and about 10 percent open to the main tank.

The avionics stack and the audio panel controls were examined. The avionics master switch was in the OFF position. The No. 1 communications radio was selected to a frequency of 125.1, while the No. 2 communications radio was on 121.1. For the audio control panel, the transmitter was selected to the No. 1 communications radio and the speaker was selected to the No. 2 communications radio.

The cockpit landing gear and flap selector levers were in the UP positions. The magneto switch was in the BOTH position and electrical continuity was established both inside the switch and to both magnetos. The fuel gages showed 3/4 full for both tip tanks and 9 gallons for the main tank. The electric fuel boost pump switch was in the OFF position. The hydraulic power switch was in the ON position and the gage read 800 psi.

MEDICAL AND PATHOLOGICAL INFORMAITON

The pilot sustained fatal injuries in the accident and an autopsy was conducted by the Clark County, Nevada, Medical Examiners Office. Tissue and fluid samples were retained for toxicological analysis by the FAA Civil Aeromedical Institute in Oklahoma City, Oklahoma. The results of the toxicological tests were negative for carbon monoxide, cyanide, ethanol, and all screened drug substances.

TESTS AND RESEARCH

Following recovery of the aircraft from the crash site, the engine was examined in detail on October 17, 2000.

The crankshaft was rotated by hand, with compression developed in each cylinder, and accessory gear and valve train continuity established. Each like valve (i.e. intake and exhaust) were observed to lift equally. Borescope examination of the cylinder interiors revealed that the pistons and valve heads were intact. Deposits of rust were evident on the cylinder walls, with no scoring evident.

The oil pan was removed. No debris was observed in the pan. The internal portions of the

crankcase were examined from the bottom with the pan removed, with no unusual operating or heat signature observed on any journal.

Both magnetos were impact damaged and would not rotate.

All of the spark plugs (Champion RHB-36P's) were sooty. The Nos. 3 and 5 bottom plugs were oil soaked. No visual evidence of electrode erosion was noted.

All six fuel injectors were clear. The distributor screen was clean; however, the internal body housing had a yellowish colored deposit on the walls, with a gray powdery pasty residue evident; this material could not be rubbed off.

The engine driven fuel pump was disassembled. The drive shear point was intact. The vanes and pump chamber wall were unremarkable.

ADDITIONAL INFORMATION

The wreckage was released to an adjuster for the pilot's insurance company, who was representing the estate, at the conclusion of the airframe and engine examinations on October 17, 2000. When last observed, the wreckage was at the facilities of Aircraft Recovery Services, Compton, California. No components were retained.

Pilot Information

Certificate:	Private	**Age:**	71,Male
Airplane Rating(s):	Single-engine land; Single-engine sea	**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:**	March 14, 2000
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 23, 1999
Flight Time:	1060 hours (Total, all aircraft), 100 hours (Total, this make and model), 980 hours (Pilot In Command, all aircraft), 6 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Navion	**Registration:**	N2434T
Model/Series:	G G	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4-2434
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 3, 2000 Annual	**Certified Max Gross Wt.:**	3150 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1857 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	Installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO-470H
Registered Owner:	On file	**Rated Power:**	260 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LAS,2179 ft msl	**Distance from Accident Site:**	7 Nautical Miles
Observation Time:	10:56 Local	**Direction from Accident Site:**	335°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	0°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	19°C / 2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(L15)	**Type of Flight Plan Filed:**	None
Destination:	BAKERSFIELD, CA (L45)	**Type of Clearance:**	None
Departure Time:	10:33 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	Henderson L15	**Runway Surface Type:**	Asphalt
Airport Elevation:	2458 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	36	**IFR Approach:**	None
Runway Length/Width:	5000 ft / 60 ft	**VFR Approach/Landing:**	Forced landing

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:**	35.966667,-115.116668

Administrative Information

Investigator In Charge (IIC):	Rich, Jeff
Additional Participating Persons:	JACK HOLBROOK; FAA, Las Vegas FSDO; Las Vegas, NV Michael J Grimes; Teledyne Continental Motors; Lancaster, CA
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Investigation Class:	Class
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