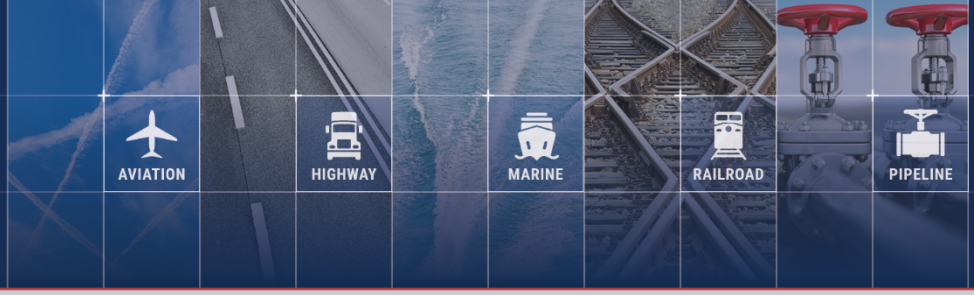

Aviation Investigation Final Report

Location:	BIG BEAR CITY, California	**Accident Number:**	LAX95FA053
Date & Time:	December 19, 1994, 13:52 Local	**Registration:**	N8794H
Aircraft:	NORTH AMERICAN NAVION-A	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal, 1 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

WITNESSES REPORTED THAT THE AIRCRAFT LIFTED OFF RUNWAY 8 IN AN UNUSUALLY NOSE-HIGH ATTITUDE WITH A SHALLOW CLIMB ANGLE. THE AIRCRAFT CONTINUED ON THE RUNWAY HEADING UNTIL IT SETTLED INTO A GROUP OF TREES 0.4 MILES FROM THE END OF THE RUNWAY. THE AIRCRAFT OWNER'S MANUAL INDICATED THE DISTANCE REQUIRED TO TAKE OFF AND CLEAR A 50-FOOT OBSTACLE UNDER NO WIND CONDITIONS WOULD BE APPROXIMATELY 4,700 FEET. THE 5,850-FOOT-LONG, HARD-SURFACED RUNWAY HAS A SLIGHT RISE IN THE CENTER, BUT OTHERWISE HAS NO SLOPE. WINDS WERE 7 KNOTS FROM 080 DEGREES. WING FLAPS WERE NOT UTILIZED. THE STAND OF TREES OFF THE END OF THE RUNWAY WAS BETWEEN 25 TO 35 FEET IN HEIGHT AND SITUATED ON SLIGHTLY RISING TERRAIN. NO SIGNIFICANT DISCREPANCIES WERE NOTED IN THE EXAMINATION OF THE ENGINE OR AIRFRAME. THE SAFETY BOARD CONCURS WITH THE TECHNICIAN THAT THE ABNORMALITY FOUND IN THE CARBURETOR HAD NO ROLE IN THE CAUSE OF THIS ACCIDENT. THE AIRPORT ELEVATION IS 6,750 FEET AND THE TEMPERATURE WAS ABOUT 51 DEGREES. THE DENSITY ALTITUDE WAS CALCULATED TO BE 7,600 FEET.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the pilot's initial overrotation, his failure to attain the proper climb airspeed, and an inadvertent entry into a stall mush condition. A factor in the accident was the high-density altitude.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (F) WEATHER CONDITION - HIGH DENSITY ALTITUDE
2. (C) ROTATION - EXCESSIVE - PILOT IN COMMAND
3. (C) AIRSPEED - NOT ATTAINED - PILOT IN COMMAND
4. (C) STALL/MUSH - INADVERTENT - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
5. OBJECT - TREE(S)

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

Findings
6. FUEL SYSTEM - RUPTURED
7. FLUID,FUEL - FIRE

Factual Information

HISTORY OF FLIGHT

On December 19, 1994, at 1352 Pacific standard time, a North American Navion-A, N8794H, was destroyed by impact and postcrash fire at Big Bear City, California. The aircraft was privately owned and operated, and was on a personal cross-country flight. Visual meteorological conditions prevailed at the time and no flight plan was filed for the operation. The certificated commercial pilot and one of the two passengers sustained fatal injuries. The remaining passenger, a certificated private helicopter pilot, received serious injuries. The flight originated from Whiteman airport at approximately 1030 on the day of the accident.

The owner stated that before takeoff from Whiteman airport, he and the pilot discussed several possible destinations, including Big Bear. When that destination was mentioned, they referred to the aircraft owner's manual and concluded that the takeoff performance would be marginal after considering the aircraft gross weight and density altitude at Big Bear. The owner stated that he told the pilot that he thought they should fly to Santa Barbara instead. He also stated that, initially, the pilot-rated passenger had expressed an interest in going to Big Bear.

The pilot-rated survivor stated that he had wanted to go north along the coast, but the pilot suggested Big Bear. He said that the owner told them it would be alright for them to go to either Santa Barbara or Big Bear. He stated that the owner and pilot performed a weight and balance using estimated weights for the passengers. He also reported that the owner cautioned the pilot to be careful if he went to Big Bear, because the aircraft would be heavy and Big Bear was a high-altitude airport. The owner told the survivor that the first hour of operation was to be at his own expense but, after that, the passenger/pilot would have to pay for the fuel.

According to the survivor, after completing preflight and before takeoff checks, the pilot flew to Big Bear. Upon arrival, the pilot parked the aircraft and all three ate lunch. When they returned after lunch, the pilot had difficulty in starting the aircraft. After several unsuccessful attempts, the battery ran down. The pilot then went back inside the airport to call for assistance. A line technician brought out a portable battery and the next start attempt was successful. The survivor reported that the pilot initially connected the jumper cables "backwards," which caused a large "spark." The line technician did not mention the incident during his interview.

The survivor, who was seated in the right front seat, said that after start, the engine idled roughly and the pilot performed a magneto check. He said he recalled that there had been an rpm drop on the left magneto, but no drop when switched to the right magneto. Prior to takeoff, the pilot made a "quick" magneto check and an adjustment to the engine controls.

When asked, he did not recall if the pilot made a power check. He stated that the engine ran smoothly during the takeoff ground roll and initial lift-off. After lift-off, however, the aircraft did not seem to climb very well and the pilot seemed to have difficulty maintaining control.

Witnesses reported seeing the aircraft lift-off in a nose-high attitude with a shallow climb angle. The aircraft climbed straight out to between 100 and 200 feet agl when it began to "mush" in a nose-high, wobbly, wing-level attitude, until it gradually settled into a group of trees.

The survivor reported that the aircraft initially climbed to an altitude of 400 feet agl. He stated that during the climb, the pilot became agitated and began making a series of control adjustments while uttering a series of expletives. Both he and two witnesses on the ground reported that the engine "popped," and then "popped" again, just before the aircraft struck the trees.

The airport manager stated that he was watching out the window as the aircraft departed. Prior to departure, he had provided airport advisory information to the pilot over the airport UNICOM frequency. Shortly after the takeoff, he heard a short radio transmission consisting of "Oh no," followed by a 2-second pause, and then "Holy (expletive deleted)." He said he was certain that both transmissions came from the accident aircraft since he had just communicated with the pilot and recognized his voice. He then went outside and saw a column of black smoke beyond the departure end of the runway. He made several attempts to call "911," but found the telephone lines to be busy. After the crash, he also heard an emergency locator transmitter (ELT) over the UNICOM guard frequency, but reported that the signal stopped less than a minute later.

He preceded to the accident site and found one of the occupants on the ground outside the aircraft. He asked the survivor where his flight originated, but the survivor was unable to recall the name of the airport. The survivor stated that the aircraft was owned by Kenneth Woods, but that Mr. Woods had not been on board. He observed that the survivor had sustained what appeared to be both burns and lacerations, particularly to his face and hands.

PERSONNEL INFORMATION

The owner reported that the pilot had previously flown the accident aircraft approximately 70 hours and was familiar with the aircraft systems and procedures. He also stated that he and the pilot had previously flown into the Big Bear airport, but on that occasion had taken off on runway 26.

AIRCRAFT INFORMATION

The aircraft main tanks were topped off with 21.4 gallons of 80/87 aviation fuel at the Whiteman airport just prior to takeoff. According to the aircraft owner, the capacity of the main tanks is slightly more than 20 gallons each. Both tanks are interconnected to a gravity-

fed accumulator tank with a 3/4-gallon capacity. The owner also reported that the aircraft was equipped with two auxiliary tanks which contained 2 or 3 gallons each in order to keep the seals "wet."

Fuel is normally supplied to the engine from the accumulator tank by an engine-driven fuel pump. However, the aircraft owner's manual specifies that during takeoff, the electric fuel boost pump switch should be in the "on" position. The owner confirmed that this procedure was followed whenever he had flown with the pilot.

According to the weight and balance table in the aircraft owner's manual, investigators estimated that the aircraft gross weight at the time of the accident was approximately 2,500 pounds. Interpolating from the takeoff table in the aircraft owner's manual, investigators estimated the distance required to take off and clear a 50-foot obstacle would be approximately 4,700 feet.

AIRPORT INFORMATION

According to the airport manager, the single runway has a slight rise in the center, but otherwise has no slope. Approximately 0.4 miles off the departure end of runway 08 is a stand of trees. Investigators estimated the average height varied from 25 to 35 feet. There were no other significant obstacles identified along the initial departure path.

WRECKAGE AND IMPACT INFORMATION

The aircraft impacted in a grove of trees about 0.4 mile beyond the departure end of the runway. The initial impact mark was about 20 feet from the base of a tree 35 feet in height. The diameter of the tree at the point of impact was approximately 18 inches. Several tree limbs were severed during the impact and were found near the base of the tree. The left stabilizer was found 36 feet beyond the initial impact point and was displaced laterally about 12 feet to the right along an axis of 050 degrees from the first strike. A 6-foot section of the right wing tip was found about 1 foot from the base of the tree.

The second tree strike was approximately 39 feet beyond the first and was displaced laterally about 8 feet to the left along an axis of 050 degrees from the second strike. The second impact mark was at about 18 feet from the base of a tree 30 feet in height. The diameter of the tree at the point of impact was about 16 inches. The left wing of the aircraft was found lodged in the branches at approximately 18 feet from the base.

The main wreckage was located about 8 feet beyond the second impact point and was displaced about 6 feet to the right along an axis of 055 degrees from the second strike. The aircraft came to rest on its belly in a near-level attitude. The fuselage exhibited extensive fire damage from the accessory section aft, through the aircraft empennage. The remaining section of the right wing had been fully engulfed. The left main landing gear was located 12 feet from the nose of the aircraft along an axis of 025 degrees. None of the landing gear down

locks were engaged. The final heading of the aircraft at rest was 055 degrees.

The magneto switch was found in the "both" position. The gear handle was "up." The propeller and throttle were full increase and full open, respectively. The vernier-type mixture control was extended 1 1/4 inches. The flap handle was "up." The fuel boost switch was destroyed. The fuel selector switch was found in the 6 o'clock position. According to the owner, that position corresponds to "on" for the main wing tanks. Continuity was established in all flight controls. The elevator trim position was not established due to impact damage. The wing flaps were found in a retracted position.

Fuel was found in three of the tanks on board the aircraft. The fuel color was red in appearance.

The propeller and engine were found still attached in combination. The "T" drive had separated from the accessory case. The entire accessory section showed evidence of a postcrash fire. There was no external evidence of any material failures.

The propeller was found with both blades free to rotate in the hub. Oil was found in the propeller pitch change diaphragm chamber. The propeller governor exhibited thermal damage and could not be rotated by hand. The propeller blades both exhibited some leading edge damage and torsional twisting. One blade was bent forward and had evidence of "S" bending. The prop spinner had some indications of rotational scarring and residue resembling tree bark.

The exhaust system was intact and exhibited no occlusions.

The engine crankcase was found to be intact. Lubrication was present throughout the interior sections. The crankshaft was intact and could be turned by hand through 360-degrees of rotation. All rocker bosses, valves, springs, and rocker arms were intact. When the crankshaft was rotated, all six cylinders produced compression with a thumb compression check and valve actuation was observed to all six cylinders.

The No. 6 cylinder was removed and visually inspected. The cylinder walls exhibited evidence of rust. The walls did not exhibit any evidence of scoring. The No. 6 cylinder head was cracked between the valve seats. The No. 6 piston was exhibited combustion patterns on its dome and the skirt was free of scoring. The piston rings were all intact, in their proper position, and free moving in their seats.

The oil screen was removed and visually inspected. It exhibited postcrash fire damage, but was free of notable contaminants.

Both magnetos and their harness were removed and visually inspected. The right magneto had been exposed to postcrash fire. The magneto shaft was seized and would not rotate. The left magneto was rotated by hand and produced a spark.

All 12 Champion REM-38P spark plugs were removed and visually inspected. All 12 had nominal gapping and electrode erosion. The No.s 6 top and 5 bottom plugs were oily. All other plugs were dry and exhibited gray/brown insulator tips and electrodes.

The engine-driven fuel pump was recovered and examined. It could be rotated by hand with some effort. The exterior of the pump exhibited evidence of exposure to postcrash fire. The pump drive coupling was found intact. Upon disassembly, it was noted that the clearance between the vane tips and the pump case was 0.024 inches. The vanes were intact.

It was the opinion of the technician of Airmotive Carburetors that, with the amount of wear found, it was questionable as to whether the pump was capable of producing its designed 9-11 psi. A representative of Teledyne Continental Motors reported that the prescribed vane service wear limit is 0.003 inches. The pump vane clearance measured .021 inches beyond the prescribed limit. It was his opinion that the pump was capable of providing sufficient fuel pressure necessary to meet the power demands placed on the engine. The extent of damage to the pump prevented flow testing.

The air induction system was intact, but did show evidence of crushing.

When the carburetor was disassembled, it was found that the accelerator pump spring and the idle run springs were reversed. It was the technician's opinion that, although the springs were of different sizes, the abnormality should not have caused a fuel flow problem. All five diaphragms were removed and inspected. The idle and the pump diaphragm exhibited some cracking. Again, it was the technician's opinion that the cracking was not sufficient to have caused any fuel flow problems.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot by the San Bernardino County Coroner's Office, with specimens retained for toxicological examination. The coroner's office reported the pilot's carboxyhemoglobin saturation was 5.7 percent. The threshold limit for the Forensic Toxicology Fatal Accident Report conducted by the Federal Aviation Administration (FAA) Civil Aeromedical Institute (CAMI)is 10 percent.

SURVIVAL ASPECTS

The surviving pilot-rated passenger, who was seated in the right seat, was able to extricate himself from the wreckage, but not before sustaining burns to his hands and body. He reported difficulty in opening the sliding canopy. He did not report being given an emergency briefing. The remaining occupants did not evacuate the aircraft. They were removed from the wreckage after the fire had been suppressed and rescue personnel had arrived on the scene.

ADDITIONAL INFORMATION

The aircraft was recovered by representatives of the owner and was secured in an aircraft storage facility. The Safety Board did retain custody of the aircraft and it was released on March 21, 1995.

Pilot Information

Certificate:	Commercial	**Age:**	29,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Instrument airplane	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	October 29, 1993
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	600 hours (Total, all aircraft), 70 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	NORTH AMERICAN	**Registration:**	N8794H
Model/Series:	NAVION-A NAVION-A	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	NAV-4-794
Landing Gear Type:	Retractable - Tricycle	**Seats:**	5
Date/Type of Last Inspection:	December 7, 1993 Annual	**Certified Max Gross Wt.:**	2750 lbs
Time Since Last Inspection:	128 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3993 Hrs	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed	**Engine Model/Series:**	E-185
Registered Owner:	KENNETH R. WOODS	**Rated Power:**	205 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:	L35 ,6748 ft msl	**Distance from Accident Site:**	
Observation Time:	13:55 Local	**Direction from Accident Site:**	245°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	80°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	11°C / -12°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:		**Type of Flight Plan Filed:**	None
Destination:	PACOIMA , CA (WHP)	**Type of Clearance:**	None
Departure Time:	13:51 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	BIG BEAR CITY L35	**Runway Surface Type:**	Asphalt
Airport Elevation:	6748 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	8	**IFR Approach:**	None
Runway Length/Width:	5850 ft / 75 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal, 1 Serious	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal, 1 Serious	**Latitude, Longitude:**	34.23001,-116.859565(est)

Administrative Information

Investigator In Charge (IIC):	Crispin, Robert
Additional Participating Persons:	JOSEPH P GERBINO; EL SEGUNDO , CA CARL CHRISTOPHER; RIVERSIDE , CA MICHAEL J GRIMES; LANCASTER , CA
Original Publish Date:	May 18, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=28902