



# National Transportation Safety Board Aviation Accident Final Report

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|--------------------------------|-----------------------------------------------|-------------------------|-------------|
| <b>Location:</b>               | BURLINGTON TWP., NJ                           | <b>Accident Number:</b> | DCA00MA080A |
| <b>Date &amp; Time:</b>        | 08/09/2000, 0752 EDT                          | <b>Registration:</b>    | N27944      |
| <b>Aircraft:</b>               | Piper PA-31 NAVAJO                            | <b>Aircraft Damage:</b> | Destroyed   |
| <b>Defining Event:</b>         |                                               | <b>Injuries:</b>        | 9 Fatal     |
| <b>Flight Conducted Under:</b> | Part 135: Air Taxi & Commuter - Non-scheduled |                         |             |

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## Analysis

A Piper PA-31-350 Navajo Chieftain, N27944, operated by Patuxent Airways, Inc., Hollywood, Maryland, and a Piper PA-44-180 Seminole, N2225G, operated by Hortman Aviation Services, Inc., Philadelphia, Pennsylvania, were destroyed when they collided in flight over Burlington Township, New Jersey. The airline transport pilot, commercial pilot, and seven passengers aboard the Navajo Chieftain were killed, as were the flight instructor and the private pilot aboard the Seminole. Day visual meteorological conditions existed at the time of the accident, and both airplanes were operating under visual flight rules when the collision occurred. The flight crews of both airplanes were properly certificated and qualified in accordance with applicable Federal regulations. None of these individuals was experiencing any personal problems or rest anomalies that would have affected their performance. The airplanes had undergone the required inspections. Examination of their maintenance documents revealed that both airplanes complied with all appropriate airworthiness directives. Evidence gathered from the wreckage indicated that neither airplane had experienced an in-flight fire, bird strike, or structural or mechanical failure. Tissue samples revealed that the pilot of the Seminole had taken doxylamine sometime before the accident. (Doxylamine is a sedating antihistamine that has substantial adverse effects on performance.) However, the amount of blood available for analysis was insufficient for determining exactly when the pilot may have ingested the medication or whether his performance was impaired by the effects of doxylamine. A partial cockpit visibility study revealed that the Seminole would have been visible to the pilots in the Chieftain for at least the 60 seconds before the collision. No stereo photographs from a Seminole cockpit were available to determine precise obstruction angles. However, because of the relative viewing angle, the Chieftain would have been visible to the pilots in the Seminole for most of the last 60 seconds. The study further revealed that about 4 seconds before impact, or about .11 nm separation, the angular width of each airplane in each pilot's field of vision would have been approximately 0.5 to 0.6 degrees or about 1/4 inch apparent size at the windscreen.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the failure of the pilots of the two airplanes to see and avoid each other and maintain proper airspace separation during visual flight rules flight.

## Findings

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Occurrence #1: MIDAIR COLLISION

Phase of Operation: CRUISE

Findings

1. (C) VISUAL LOOKOUT - INADEQUATE - PILOT IN COMMAND

## Factual Information

### HISTORY OF FLIGHT

On August 9, 2000, at 0752 eastern daylight time (all times in this brief are eastern daylight time based on a 24-hour clock), a Piper PA-31-350 Navajo Chieftain, N27944, operated by Patuxent Airways, Inc., and a Piper PA-44-180 Seminole, N2225G, operated by Hortman Aviation Services, Inc., collided in flight over Burlington Township, New Jersey. The captain, first officer, and seven passengers aboard the Chieftain were killed, as were the flight instructor and the certificated private pilot aboard the Seminole. Both airplanes were destroyed. The Chieftain was operating under 14 Code of Federal Regulations (CFR) Part 135 as a visual flight rules (VFR) charter flight for Department of the Navy personnel. The Seminole was operating under 14 CFR Part 91 as a local, multiengine airplane instructional flight. Day visual meteorological conditions existed at the time of the collision.

The Chieftain was en route from Trenton Mercer County Airport (TTN), Trenton, New Jersey, to Naval Air Station Patuxent River, Maryland. TTN air traffic control cleared the Chieftain for takeoff at 0746. At 0748, the tower controller cleared the crew to change to radio frequency 123.8 MHz (a Philadelphia Approach Control frequency), which the crew acknowledged. No further transmissions were heard from the airplane on any frequency. Impact and fire damage prevented investigators from determining the radio frequencies that had been selected by the Chieftain crew.

The Seminole departed Northeast Philadelphia Airport (PNE), Philadelphia, Pennsylvania, under VFR, from runway 24, at 0745. (PNE is located 14.5 nautical miles [nm] southwest of TTN.) Shortly after takeoff, the tower controller stated, "two five golf frequency change approved," and a crewmember responded, "two five golf." No further transmissions were heard from the airplane on any frequency. Investigators found that the Seminole's radio transmitter had been set to the COMM 2 ("communications radio 2") position. The COMM 1 switch was in the ON position, and the frequency was set to 121.70. The COMM 2 switch was in the TEST position, and the frequency was set to 126.90. PNE's ground control frequency was 121.70, and the tower frequency was 126.90.

According to airport personnel who talked to the Seminole's instructor pilot before takeoff, no practice instrument flight was to be accomplished. The president of Hortman Aviation stated that radar advisories were not normally requested during training flights. He also stated that company aircraft were supposed to fly with strobe lights on at all times. When advised that the Seminole was flying between 130 and 135 knots' airspeed when the accident occurred, the president stated that the airplane would not have been doing maneuvers at that time because that airspeed was too high.

The recorded radar data indicate that shortly before the collision, the Seminole was flying generally northeast, and the Chieftain was flying generally south. Both airplanes were flying at about 3,000 feet. About a minute before the collision, the Seminole started a gradual left turn toward the north-northeast. The last secondary radar return before the collision was received from the Seminole at 0752:37.68 at an altitude of 3,000 feet, less than .4 nm southwest of the Chieftain's last radar return. The only returns received after 0752:37.68 in the area surrounding the collision were primary returns that began to appear at 0752:42.35, near the

last secondary returns associated with the Chieftain and Seminole. The loss of secondary returns and the appearance of a cloud of primary returns are consistent with loss of power to the transponders and the breakup of the two airplanes following the collision.

## PILOT INFORMATION

### The Chieftain Captain

The Chieftain captain held an airline transport pilot certificate with ratings for multiengine land airplanes and single-engine land airplanes. His latest Federal Aviation Administration (FAA) second-class medical certificate had no limitations and was dated February 11, 1999. According to Patuxent Airways' records, the captain had 3,968 hours of flight time, 3,651 hours of multiengine flight time, and 1,418 hours of flight time in Piper Navajo Chieftains. He had 122 hours of flight time in the previous 90 days, 21 hours in the previous 30 days, and no flight time in the previous 24 hours. His last flight before the accident flight was on July 19, 2000.

The captain successfully completed an "Airman Competency/Proficiency Check, FAR [Federal Aviation Regulation] 135" in a PA-31-350, on February 13, 2000. He was designated as Patuxent Airways' chief pilot in November 1998. In a June 13, 2000, letter from the FAA, the captain was also designated as a "Proficiency Check Pilot - Aircraft" and a "Line Check Pilot - All Seats," effective May 24, 2000.

According to peers and employers, the captain was a good pilot. Interviews with his wife revealed no personal problems or rest anomalies.

### The Chieftain First Officer

The first officer was a certificated commercial pilot with ratings in multiengine land airplanes, single-engine land airplanes, and single-engine seaplanes. He was also certified as a flight instructor and instrument instructor in both multiengine and single-engine airplanes. His latest FAA first-class medical certificate had no limitations and was dated April 21, 2000. According to Patuxent Airways' records and a multiengine flight time estimate, the first officer had 2,185 hours of flight time, 700 hours of multiengine time, and 298 hours in Piper Navajo Chieftains. The first officer had 110 hours of flight time in the previous 90 days, 38 hours in the previous 30 days, and no flight time in the previous 24 hours. His last flight before the accident flight was on August 4, 2000. The first officer successfully completed an "Airman Competency/Proficiency Check, FAR 135" in a PA-31-350, on January 27, 2000.

The first officer's employer stated that he had not flown with the first officer, who had flown almost exclusively with the accident captain. Interviews with first officer's parents revealed no personal problems or rest anomalies.

### The Seminole Flight Instructor

The flight instructor was certified as a flight instructor and instrument instructor in both multiengine and single-engine land airplanes. He had been a flight instructor for about 10 years and had received his rating as a multiengine flight instructor on March 23, 2000. He also held a commercial pilot certificate for multiengine and single-engine land airplanes. The flight instructor's latest FAA second-class medical certificate, dated July 3, 2000, required that he wear corrective lenses. The flight instructor's last logbook entry was for a flight on July 13, 2000. As of that date, he had 1,442 hours of flight time, 60 hours of multiengine flight time, and 773 hours of flight time as a flight instructor, with 3 of those hours in multiengine airplanes.

His employer stated that everyone liked the way in which the flight instructor taught, and that he did not think the flight instructor ever had a student who failed a checkride. Interviews with the instructor's wife revealed no personal problems or rest anomalies.

### The Seminole Pilot Receiving Instruction

The pilot receiving multiengine flight instruction was a certificated private pilot, rated in single-engine land airplanes. His latest second-class medical certificate, dated August 20, 1998, required that he wear contact lenses for distance vision. He had 187 hours of flight time, with 12 hours in multiengine airplanes. He had 52 hours of flight time in the previous 90 days, 8 hours in the previous 30 days, and no flight time in the previous 24 hours. This was not the student pilot's first multiengine flight.

The private pilot was described as "a low-key guy who knew what he wanted," "a real good student," and "conscientious." An interview with his mother revealed no personal problems or rest anomalies.

## AIRPLANE INFORMATION

### Chieftain Description and Maintenance History

The Chieftain was a twin-engine, retractable landing gear, multipurpose airplane with counter-rotating propellers. The cabin accommodated up to eight passengers.

The last annual inspection was conducted January 12, 2000. The last 100-hour inspection was conducted July 14, 2000. The altimeter was calibrated to 20,000 feet on April 30, 1999, and the last static system check was accomplished on April 30, 1999. Examination of maintenance documents revealed that the airplane complied with all appropriate airworthiness directives. No anomalies were noted in the maintenance records.

### Seminole Description and Maintenance History

The Seminole was a twin-engine, retractable landing gear aircraft with counter-rotating propellers. It could carry up to four occupants.

The last annual inspection was conducted April 28, 2000. The last 100-hour inspection was

conducted July 11, 2000. The altimeter was calibrated to 20,000 feet, and the last static system check was accomplished on March 28, 1997. Examination of maintenance documents revealed that the airplane complied with all appropriate airworthiness directives.

The last transponder test and inspection was also conducted on March 28, 1997. This test and inspection are required by 14 CFR 91.413(a) within the previous 24 months if the airplane is flown in class A, class B, and class C airspace or below 10,000 feet within 30 nm of Philadelphia International Airport (PHL) [see 14 CFR 91.215(b)(1) and (2)].

#### METEOROLOGICAL INFORMATION

PNE, which is located approximately 9 miles west of the accident location, is the facility nearest the accident site that is capable of recording local weather observations. PNE is equipped with an unaugmented automated surface observing system (ASOS). The weather observation nearest the time of the accident was as follows: time, 0754; type [aviation routine weather report], METAR; wind, 240 degrees at 5 knots; visibility, 10 miles; present weather, none; sky condition, overcast 8,000 feet; temperature, 25 degrees Celsius; dew point, 21 degrees Celsius; altimeter setting, 29.94 inches hg [of mercury].

#### AIRPORT INFORMATION

##### Accident Area Airspace

The accident occurred in class E (uncontrolled) airspace. About 5 nm south of the accident site, low-altitude VFR airspace funnels into a "corridor" between the class B airspace and an alert area. Specifically, PHL class B airspace extends about 7 nm southwest of the accident site; its 15-mile ring has a floor of 3,000 feet mean sea level. McGuire Air Force Base Alert Area A-220 is located about 5 nm east of the accident site. The VFR corridor, which runs northeast to southwest, is about 4 nm wide and 12 miles long.

##### Trenton Departure Considerations - Patuxent Airways

A former captain for Patuxent Airways stated that company flights departed TTN many times under VFR to avoid delays in receiving departure clearances. The former captain stated further that instrument flight rules flight routing typically added another 50 to 70 miles to the trip and subjected flights to additional radar vectors to accommodate traffic arriving at and departing from PHL. He also noted that VFR advisories were normally difficult to get because they were available on a "workload permitting" basis, and usually, only a north-sector controller and a south-sector controller were on duty in the early morning.

#### WRECKAGE DISTRIBUTION

The wreckage was spread between two main debris fields. The wreckage path began with the collocation of the outboard section of the Seminole's right wing and the Chieftain's rudder trim tab and ended with the Chieftain's right engine. Most of the Seminole wreckage was spread out in a soybean field located in Florence, New Jersey, and most of the Chieftain wreckage was located in the attached garage of a residential home in Burlington, New Jersey. Postcrash fire destroyed most of the Chieftain wreckage.

#### AIRWORTHINESS EXAMINATION

Both airplane engines exhibited evidence that their propellers were turning at the time they

collided. The Seminole wreckage had at least five blade strikes, and the Chieftain wreckage had two. From the blade strike angles and the compression damage to the Seminole's left wing, investigators determined that the angle of impact was 135 degrees, consistent with the southerly track of the Chieftain and the north-northeasterly track of the Seminole, with the Seminole being slightly above the Chieftain. Neither airplane displayed evidence consistent with an in-flight fire, bird strike, or structural or mechanical failure.

#### MEDICAL AND PATHOLOGICAL INFORMATION

Toxicological testing for each of the pilots was performed by the FAA Toxicology and Accident Research Laboratory in Oklahoma City, Oklahoma. Concerning the private pilot who was operating the Seminole, 0.301 (ug/ml, ug/g) doxylamine was detected in kidney tissue, and 0.544 (ug/ml, ug/g) doxylamine and an undetermined amount of pseudoephedrine was detected in liver tissue. (Doxylamine is a sedating over-the-counter antihistamine, used in many sleep aids and in many multisymptom nighttime cold relievers. Pseudoephedrine is a common decongestant used in many over-the-counter cold and allergy preparations. It is used in some of the same multisymptom preparations as doxylamine.) The amount of blood available was insufficient for further analysis of the medications. No other tested drugs or ethanol were present in the tissue samples tested from the Seminole pilot. All tested tissue samples and fluids from the other three pilots involved in this collision were negative for tested drugs and ethanol. Tests for carbon monoxide and cyanide were not performed because suitable specimens were not available.

#### COMPANY INFORMATION

Patuxent Airways, Inc.

According to a Department of the Air Force, Headquarters Air Mobility Command, biennial survey, conducted on February 17 and 18, 2000, Patuxent Airways, Inc., began operations as a Part 135, on-demand air carrier in 1989. Approximately 90 percent of Patuxent's charter flights were conducted in support of a Department of Defense (DoD) contract. The company, located in Hollywood, Maryland, operated four Navajo Chieftains under the terms of the contract.

Most flight operations were split between the Patuxent River area and the Naval Air Engineering Station at Lakehurst, New Jersey, with approximately 40 percent of the flights initiated from Lakehurst. The accident airplane and crew were based at Lakehurst, but flight operations brought them to company headquarters about three times per week.

At the time of the survey, the company employed six captains and four first officers. Captains had an average experience level of 3,700 hours of flight time, and first officers, 1,500 hours of flight time.

Results of the survey revealed that the company met or exceeded all standards for "continued participation in the DoD Air Transportation Program."

Hortman Aviation Services, Inc.

Hortman Aviation Services, Inc., located at PNE, was founded in the early 1940s. The company operated as a FAR Part 141/61 flight school, offering flight training that ranged from private pilot licenses through airline transport pilot certifications. The company also operated a maintenance department and airplane rental service. The Hortman Aviation fleet consisted of 32 airplanes. The company also provided air charter services.

#### TESTS AND RESEARCH

A partial cockpit visibility study using stereo photographs from a Chieftain cockpit was performed to determine if the cockpit structure would have blocked the pilot's and copilot's view. The study revealed that the Seminole would have been visible to the pilots in the Chieftain for at least the 60 seconds before the collision. No stereo photographs from a Seminole cockpit were available to determine precise obstruction angles. However, because of the relative viewing angle, the Chieftain would have been visible to the pilots in the Seminole for most of the last 60 seconds. The study further revealed that about 4 seconds before impact, or about .11 nm separation, the angular width of each airplane in each pilot's field of vision would have been approximately 0.5 to 0.6 degrees or about 1/4 inch apparent size at the windscreen.

#### ADDITIONAL INFORMATION

##### Radar Traffic Information Service

According to the Aeronautical Information Manual (AIM), paragraph 4-1-14,

Pilots receiving this service [radar traffic information] are advised of any radar display which may be in such proximity to the position of their aircraft or its intended route of flight that it warrants their attention. This service is not intended to relieve the pilot of the responsibility for continual vigilance to see and avoid other aircraft. Many factors, such as limitations of the radar, volume of traffic, controller workload and communications frequency congestion, could prevent the controller from providing this service.

##### See and Avoid Responsibilities

According to the AIM, paragraph 5-5-8, "When meteorological conditions permit, regardless of type of flight plan or whether or not under control of a radar facility, the pilot is responsible to see and avoid other traffic, terrain, or obstacles."



## Pilot Information

|                                  |                                                                                                                                                                                                 |                                          |            |
|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|------------|
| <b>Certificate:</b>              | Airline Transport                                                                                                                                                                               | <b>Age:</b>                              | , Male     |
| <b>Airplane Rating(s):</b>       | Multi-engine Land; Single-engine Land                                                                                                                                                           | <b>Seat Occupied:</b>                    | Unknown    |
| <b>Other Aircraft Rating(s):</b> | None                                                                                                                                                                                            | <b>Restraint Used:</b>                   |            |
| <b>Instrument Rating(s):</b>     | Airplane                                                                                                                                                                                        | <b>Second Pilot Present:</b>             |            |
| <b>Instructor Rating(s):</b>     | None                                                                                                                                                                                            | <b>Toxicology Performed:</b>             | Yes        |
| <b>Medical Certification:</b>    | Class 2 Valid Medical--no waivers/lim.                                                                                                                                                          | <b>Last FAA Medical Exam:</b>            | 02/11/1999 |
| <b>Occupational Pilot:</b>       |                                                                                                                                                                                                 | <b>Last Flight Review or Equivalent:</b> |            |
| <b>Flight Time:</b>              | 3968 hours (Total, all aircraft), 1418 hours (Total, this make and model), 122 hours (Last 90 days, all aircraft), 21 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft) |                                          |            |

## Aircraft and Owner/Operator Information

|                                      |                         |                                       |                          |
|--------------------------------------|-------------------------|---------------------------------------|--------------------------|
| <b>Aircraft Make:</b>                | Piper                   | <b>Registration:</b>                  | N27944                   |
| <b>Model/Series:</b>                 | PA-31 NAVAJO PA-31 NAVA | <b>Aircraft Category:</b>             | Airplane                 |
| <b>Year of Manufacture:</b>          |                         | <b>Amateur Built:</b>                 | No                       |
| <b>Airworthiness Certificate:</b>    | Normal                  | <b>Serial Number:</b>                 |                          |
| <b>Landing Gear Type:</b>            | Retractable - Tricycle  | <b>Seats:</b>                         | 10                       |
| <b>Date/Type of Last Inspection:</b> | 07/14/2000, 100 Hour    | <b>Certified Max Gross Wt.:</b>       | 7000 lbs                 |
| <b>Time Since Last Inspection:</b>   |                         | <b>Engines:</b>                       | 2 Unknown                |
| <b>Airframe Total Time:</b>          |                         | <b>Engine Manufacturer:</b>           |                          |
| <b>ELT:</b>                          |                         | <b>Engine Model/Series:</b>           |                          |
| <b>Registered Owner:</b>             | Patuxent Airways, Inc.  | <b>Rated Power:</b>                   |                          |
| <b>Operator:</b>                     | PATUXENT AIRWAYS, INC   | <b>Operating Certificate(s) Held:</b> | On-demand Air Taxi (135) |

## Meteorological Information and Flight Plan

|                                  |                    |                                         |                  |
|----------------------------------|--------------------|-----------------------------------------|------------------|
| Conditions at Accident Site:     | Visual Conditions  | Condition of Light:                     | Not Reported     |
| Observation Facility, Elevation: | KTTN, 0 ft msl     | Distance from Accident Site:            | 0 Nautical Miles |
| Observation Time:                | 0753 EDT           | Direction from Accident Site:           | 0°               |
| Lowest Cloud Condition:          | Unknown            | Visibility                              | 0 Miles          |
| Lowest Ceiling:                  | Unknown            | Visibility (RVR):                       | 0 ft             |
| Wind Speed/Gusts:                | 4 knots /          | Turbulence Type<br>Forecast/Actual:     | /                |
| Wind Direction:                  | 190°               | Turbulence Severity<br>Forecast/Actual: | /                |
| Altimeter Setting:               | 29.93 inches Hg    | Temperature/Dew Point:                  | 23° C / 22° C    |
| Precipitation and Obscuration:   |                    |                                         |                  |
| Departure Point:                 | TRENTON, NJ (TTN)  | Type of Flight Plan Filed:              | IFR              |
| Destination:                     | PATUXENT, MD (NHK) | Type of Clearance:                      | VFR              |
| Departure Time:                  | 0746 EDT           | Type of Airspace:                       | Class E          |

## Wreckage and Impact Information

|                     |         |                      |           |
|---------------------|---------|----------------------|-----------|
| Crew Injuries:      | 2 Fatal | Aircraft Damage:     | Destroyed |
| Passenger Injuries: | 7 Fatal | Aircraft Fire:       | None      |
| Ground Injuries:    | N/A     | Aircraft Explosion:  | None      |
| Total Injuries:     | 9 Fatal | Latitude, Longitude: |           |

## Administrative Information

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|------------|
| Investigator In Charge (IIC):     | ROBERT P BENZON                                                                                                                                                                                                                                                                                                                                                                                                                  | Report Date: | 01/30/2003 |
| Additional Participating Persons: | FLOYD A JAMES; FAA; Washington, DC                                                                                                                                                                                                                                                                                                                                                                                               |              |            |
| Publish Date:                     |                                                                                                                                                                                                                                                                                                                                                                                                                                  |              |            |
| Investigation Docket:             | NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at <a href="mailto:pubinquiry@ntsb.gov">pubinquiry@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> . |              |            |

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).