



Aviation Investigation Factual Report

Location:	GARDNERVILLE, Nevada	Accident Number:	LAX95LA067
Date & Time:	December 30, 1994, 16:30 Local	Registration:	N9WZ
Aircraft:	HARRIS BD-10	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	1 Fatal
Flight Conducted Under:	Part 91: General aviation		

Factual Information

On December 30, 1994, at 1630 Pacific standard time, an experimental BD-10 jet aircraft, N9WZ, was destroyed in an in-flight breakup while conducting a flight test program near Gardnerville, Nevada. The aircraft was operated by Peregrine Flight International (PFI), Inc., of Minden, Nevada, and was engaged in a test program for the purposes of qualifying for a Federal Aviation Administration (FAA) Production Type Certificate. Visual meteorological conditions prevailed. The aircraft was demolished in the breakup, impact, and postcrash fire sequence. The certificated commercial pilot, the sole occupant, sustained fatal injuries. The flight originated from the company's production facility at the Minden airport on the day of the accident about 1530.

On the day of the accident, the pilot flew two prior flights in the accident aircraft completing test card items. On the flight immediately prior to the accident flight, the speed envelope was expanded to 370 knots indicated air speed (KIAS). No discrepancies were reported at the conclusion of these two flights.

The test card for the accident flight concerned the further expansion of the speed envelope. The aircraft departed Minden on an IFR clearance and proceeded to the Reno Military Operating Area (MOA). It performed the test card elements to expand the speed envelope to Mach .82 at an altitude in excess of 30,000 feet msl. At the conclusion of the high altitude work, the aircraft descended to between 14,000 and 15,000 feet to complete the remaining test card items to expand the envelope from 370 to 380 KIAS.

On an earlier test flight at speeds between 345 and 350 KIAS, the side load forces on the vertical stabilizers reached a company imposed limit in pounds of force. The limit was established at 40 percent of the force, as demonstrated in tests by Bede Jet Corporation, to cause a yield failure of the vertical stabilizer spars at the fuselage attach point. Due to encountering the self-imposed 40 percent force limit, no rudder pulses were allowed. Only stick raps in the longitudinal and lateral modes were to be accomplished during the accident test run.

According to the pilot of the chase aircraft, one run was completed at 375 knots. During the next run, the speed was increased to 380 knots when the aircraft suddenly pitched violently nose up, followed by a general breakup. Engineering estimates by the company indicate that the pitch up exceeded 20g's. This was done by evaluating the force necessary to fail the landing gear actuators and struts (the main landing gear was forcibly ejected from the aircraft during the breakup sequence).

No reports were found that any ground station or aircraft received a distress call from the aircraft prior to the accident.

Recorded radar data was obtained from the FAA Oakland Air Route Traffic Control Center. The data retrieved included: 1) the known discrete code assignment for the aircraft while in Class A airspace; 2) code 1200 beacon returns tracked from the target identified from the discrete assigned code after the aircraft descended below Class A airspace; 3) all mode C altitude reports associated with the beacon returns; and 4) all primary skin radar returns. The recorded radar data encompassed a time period from 1615:08, to the last recorded primary skin paint return at 1634:55, in the area where the 1200 code beacon return stopped. The last 1200 code beacon return, believed to be the aircraft, was recorded at 1629:43. The location of the last beacon return was latitude 38.53.24, longitude 119.45.28.

After the recorded radar data was received, the data points were sorted by track progression and time sequence to match the flight history of N9WZ. The data points retrieved were then processed through a Safety Board computer program. The program requires altitudes to successfully run, and altitudes were supplied for those data points where the mode C report is missing by simple averaging. Once altitude points were derived, the data was processed through the programs and graphic print-outs obtained. The raw radar data as received from the FAA, and the processed data at each stage, to include the graphic chart presentations, are attached to this report.

The data starts at 1615:08 (times in parentheses are elapsed minutes and seconds from this time), with the aircraft at 31,800 feet (all mode C altitudes referenced are msl), as the target tracks a relatively straight southerly course and descends. By 1625:30 (10:12), the aircraft is at 14,300 feet and begins an ascent to 15,500 feet, which is attained at 1627:42 (12:34). The target then descends again to 14,900 feet by 1629:18 (14:10). At 1629:31 (14:23), a mode C report of 500 feet is recorded, along with a primary skin paint target which exhibits retrograde motion. The last mode C report of 14,600 feet occurs at 1629:43 (14:35). Primary skin paint targets are then recorded until 1634:55 in the immediate area.

The ground speed profile generated by the computer program ranges from 500 knots to about 420 by 5:00 elapsed minutes. The speed then increases to an average between 470 and 490 knots until about 13 elapsed minutes. It then falls to 420 knots by 13:10 elapsed time, then rapidly to near zero by the end of data.

The processed data reflects a right turn, achieving a rate of 4 degrees per second, between about 12:40 and 13:00 elapsed time. The turn rate reduces to zero by about 14:20, then increases to 14 degrees per second right to end of data.

PERSONNEL INFORMATION

The pilot held a commercial pilot certificate with airplane ratings for single engine land, multiengine land, and instruments. According to the company, he graduated from U.S. Air Force flight training in 1967, and flew single and twin engine fighter-type aircraft for 9 years. The pilot's total flight time was estimated by the company as 11,433, with 63 hours accrued in

the BD-10 aircraft.

AIRCRAFT INFORMATION

The aircraft is a two-place single engine turbo jet powered airplane of conventional metal construction. Company literature states the aircraft is capable of "mach plus" airspeeds. The aircraft was originally designed by the Bede Jet Corporation (BJC) of St. Louis, Missouri, as an amateur built kit aircraft.

In December of 1993, Peregrine Flight International purchased the design, production, and marketing rights for the aircraft.

The aircraft was manufactured during 1994, and issued an FAA experimental airworthiness certificate on November 7, 1994. The first flight of the aircraft was accomplished on November 11. At the time of the accident, the aircraft had completed 24 flights, for a total accrued flight time of 29 hours.

Review of the aircraft maintenance records revealed no unresolved discrepancies prior to the accident flight.

According to the company, the original BD-10 prototype constructed by BJC sustained a failure of a vertical stabilizer during flights at the 1994 Reno Air Races. BJC subsequently designed a fix which strengthened the vertical stabilizers. Ground substantiation load tests to failure were conducted by BJC, and the resulting yield-failure load limit was provided to PFI. The yield-failure load limit supplied by BJC was used by PFI to establish the 40 percent flight test limit. The new fix was incorporated into the accident aircraft.

METEOROLOGICAL INFORMATION

The pilot obtained a preflight weather briefing.

Postaccident examination of the meteorological reports and forecasts available at the time, revealed that no significant weather was observed or forecasted for the area of flight. Pilot reports on the dissemination circuits disclosed no reports of turbulence or other unusual meteorological phenomena.

The winds aloft forecast for Reno, Nevada, was examined. Based upon the 1609 observation, the wind direction and speed at 12,000 and 18,000 feet, respectively, were 280 degrees at 10 knots and 290 degrees at 15 knots. The observed temperature lapse rate was 2.33 degrees celsius.

The pilot of the chase aircraft reported that the flight conditions were smooth.

WRECKAGE EXAMINATION

The wreckage was examined at the PFI production facilities after recovery from the accident site. The examination was conducted by a Safety Board Aerospace Engineer, with assistance from an FAA Engineer from the Kansas City Aircraft Certification Office. Initial on-site documentation, to include locations of aircraft components, was overseen by FAA inspectors from the Reno, Nevada, Flight Standards District Office. The Structures Group Chairman factual report completed by the Safety Board engineer, is attached to this report. Wreckage distribution diagrams produced during recovery of the wreckage are also attached.

According to the Structures Group Chairman's factual report, the examination revealed that the airplane's horizontal and vertical tail assemblies sustained structural overloads and separated from the aircraft in flight. Both the left and right main wings failed as a result of gross positive overloads. The left wing separated from the aircraft, while the right wing remained attached to the fuselage.

The left vertical tail assembly was found early in the wreckage distribution path, and is largely intact with the rudder attached.

The report notes that the unit appears to have sustained a clean, almost instantaneous failure load, at the spar attachment points to the fuselage boom structure. Evidence of a bending failure mode toward the right side of the airplane was apparent.

The right vertical tail assembly was found later in the distribution path, and is distorted and partially fragmented. The structures report notes that evidence of impact with a wing flap or other wing structure is present. The unit failed and separated from the aircraft towards the right side. The left side skin assembly was pulled away from the fin and was grossly distorted and torn. The rudder separated from the unit.

MEDICAL AND PATHOLOGICAL INFORMATION

PFI company personnel who reported seeing and speaking with the pilot just before departure on the accident flight, reported that he appeared normal and rested. According to PFI company representatives, the pilot had no known illnesses and was not taking any medications.

The pilot sustained fatal injuries and an autopsy was conducted by the Douglas County Coroner's Office, with specimens retained for toxicological analysis. The results of the toxicological examinations were negative for alcohol and all screened drug substances.

TESTS AND RESEARCH

PFI constructed a production configuration left side fuselage tail boom, complete with vertical and horizontal tail components. The unit was built to the same configuration as the accident aircraft components. This assembly was then mounted on a test fixture, with strain gages

installed on the vertical stabilizer spars. The vertical tail was then loaded to failure. The failure mode and separation point was the same as that seen on the accident aircraft left vertical tail assembly. The test revealed that the vertical stabilizer spars began to yield at 40 percent of the failure load limit supplied by BJC (see AIRCRAFT INFORMATION section). Spar failure occurred at 65 percent of the BJC supplied load limit.

Pilot Information

Certificate:	Commercial	Age:	49,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	Seat Occupied:	Front
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 2 Valid Medical-w/ waivers/lim	Last FAA Medical Exam:	October 17, 1994
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	11433 hours (Total, all aircraft), 63 hours (Total, this make and model), 11433 hours (Pilot In Command, all aircraft), 36 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	HARRIS	Registration:	N9WZ
Model/Series:	BD-10 BD-10	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	Yes
Airworthiness Certificate:	Experimental (Special)	Serial Number:	10
Landing Gear Type:	Retractable - Tricycle	Seats:	2
Date/Type of Last Inspection:	July 1, 1994 Continuous airworthiness	Certified Max Gross Wt.:	4700 lbs
Time Since Last Inspection:	28 Hrs	Engines:	1 Turbo jet
Airframe Total Time:	28 Hrs	Engine Manufacturer:	GE
ELT:	Not installed	Engine Model/Series:	J85-J4
Registered Owner:	WILLIAM W. HARRIS	Rated Power:	2950 Lbs thrust
Operator:	PEREGRINE FLIGHT INTERNATIONAL	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:	RNO ,4412 ft msl	Distance from Accident Site:	32 Nautical Miles
Observation Time:	16:51 Local	Direction from Accident Site:	345°
Lowest Cloud Condition:	Clear	Visibility	30 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	/ None	Turbulence Type Forecast/Actual:	/
Wind Direction:	0°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	-1°C / -6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	MINDEN (MEV)	Type of Flight Plan Filed:	IFR
Destination:		Type of Clearance:	IFR
Departure Time:	15:35 Local	Type of Airspace:	Class A

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	None
Runway Length/Width:		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:	

Administrative Information

Investigator In Charge (IIC): Rich, Jeff

Additional Participating Persons: JAMES WOODS; RENO, NV

Report Date: August 8, 1995

Last Revision Date:

Investigation Class: [Class](#)

Note:

Investigation Docket: <https://data.nts.gov/Docket?ProjectID=29007>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).