



Fatal Commuter Training Flight Crash Blamed On Spatial Disorientation, Poor Judgment

An instructor pilot with two captain trainees on board set up training scenarios at night that constituted multiple emergencies. When a pilot trainee began suffering from spatial disorientation, the instructor refused his request to take control of the aircraft and decided instead to talk him through the emergency, with tragic results.

Editorial Staff Report

The Beechcraft 1900C twin-turboprop commuter airliner, N811BE, was on a night training flight when it crashed into the Atlantic Ocean about 10 miles (16 kilometers) from Block Island, Rhode Island, U.S., killing the three pilots on board.

An investigation determined that the aircraft struck the water in a near-inverted attitude, left wing low, with its longitudinal axis at a substantial angle to the water. The bodies of the instructor pilot (IP) and two captain-trainees were not recovered. Subsequent salvage efforts resulted in recovery of 40 percent to 50 percent of the airplane.

The U.S. National Transportation Safety Board (NTSB) concluded that the probable causes of the Dec. 28, 1991, crash were the IP's "loss of altitude awareness and

possible spatial disorientation, which resulted in the loss of control of the airplane at an altitude too low for recovery and company management's lack of involvement in and oversight of its Beechcraft 1900 flight training program."

The NTSB accident report added: "Contributing to the accident was the IP's exercise of poor judgment in establishing a flight situation and airplane configuration conducive to spatial disorientation that afforded the pilots little or no margin for error."

The 19-seat aircraft, operated by Business Express Inc., was not equipped with a flight data recorder. The cockpit voice recorder (CVR) was recovered during an underwater search. The CVR recording ended with no crew reactions to impending impact; their voices showed no indications of distress or distortion related to physical exertion.

In the recorded cockpit conversations, there was no mention by any of the pilots of any system, engine or instrument problems other than those created by the IP.

“The Board [NTSB] believes that any event that would have caused termination of the CVR must have been sudden and probably catastrophic, which leads to the conclusion that the event was a high-speed collision with the surface of the ocean.”

Weather at the time of the accident was reported as clear with 20 miles (32 kilometers) visibility. Winds were from 280 degrees at 12 knots. No moon was visible when the accident occurred.

The training flight began about 1845 local time, when the aircraft departed the Igor I. Sikorsky Memorial Airport in Bridgeport, Connecticut, about 60 miles northeast of Block Island Airport. The aircraft was operating under visual flight rules; no flight plan was filed, nor was one required. There were no recorded communications with air traffic control. The aircraft weighed about 12,830 pounds (5,280 kilograms) when it departed with an esti-

mated full load of fuel and was within weight and balance limits at the time of the accident.

The report said that “the location of the flight was essentially unknown until it was observed in the traffic pattern at the Block Island Airport about 2000” where the aircraft landed and the crew deplaned. The airport manager reported that the pilots “discussed the technical aspects of the plane and seemed in good spirits” before they departed in the aircraft sometime between 2045 and 2100. The airport manager reported that the aircraft landed again later at the airport, and remained on the ground for a few minutes with its engines operating before it departed.

The CVR discussions disclosed that the captain-trainee was practicing instrument approaches to Block Island Airport, and that the IP was introducing simulated instrument and system failures during the approaches. The conversation during the last 30 minutes of flight was confined to the training at hand without extraneous discussions. The recording began at 2114:19 during confirmation of a simulated right engine failure during a climb below 400 feet (122 meters). The captain-trainee prepared for the Block Island Airport nondirectional beacon (NDB) approach and the captain-trainee’s attitude indicator was made inoperative at 2118:03.

At 2120:04, the captain-trainee said, “Yeah it’d be easier if you’d just cover that thing up.”

“I know,” said the IP.

“Just ignore it though you know. I guess I gotta’,” said the captain-trainee.

“Yup,” said the IP.

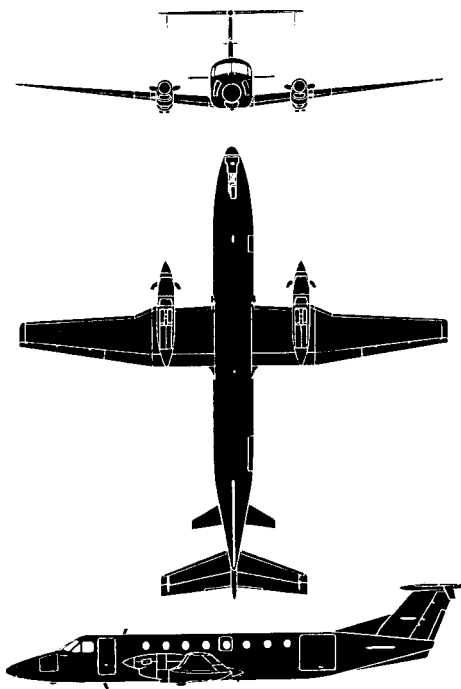
“Force myself to ignore it,” said the captain-trainee. “And just confirm that was the ah barb is on the ah left side.”

“Correct,” said the IP.

“Okay,” said the captain-trainee at 2120:20.

The cockpit conversation indicated that the approach was made without a simulated engine failure. Nevertheless, the conversation between the IP and the captain-trainee indicated that during the approach the captain-trainee was “behind the aircraft” and unsure of the procedures required to execute the approach. The aircraft landed at 2132:00 and the IP initiated a discussion about the just-completed approach.

“All right think about it. Remember,” said the IP at 2132:13.



Beechcraft 1900C Twin-turboprop

The Beechcraft 1900C twin-turboprop was first flown in 1982. The basic 1900C airliner is equipped with a cargo door and carries a crew of two and up to 19 passengers. It has a maximum cruising speed of 267 knots (495 kilometers per hour) at an altitude of 8,000 feet (2,440 meters) and a range of 1,480 miles (2,383 kilometers) with 15 passengers on board. It has a service ceiling of 25,000 feet (7,625 meters).

Source: *Jane's All the World's Aircraft*

“Yeah,” said the captain-trainee.

“You’re spacin’ out a little bit. The first thing I don’t know what you were thinkin’ when you went outbound,” said the IP.

“Yeah I just forgot to turn to my heading that all I mean I knew I was goin’ to the beacon and I just forgot to turn outbound,” said the captain-trainee.

“Yeah,” said the IP.

“I knew where I was and—,” said the captain-trainee.

“Okay,” said the IP.

“And on the partial panel,” said the captain-trainee. “All I can say is that it’s been years and it’s ah.”

“Yeah well that’s okay,” said the IP.

“But I appreciate just lettin’ me stick with it and workin’ with me on it,” said the captain-trainee.

“All right and the other thing was ah remember wait ’til you’re established inbound,” said the IP.

“Yeah I thought I had I mean I was confused,” said the captain-trainee at 2132:43.

The discussion continued between the two pilots before the aircraft departed at 2134:31 for the next approach, which would end in the Atlantic Ocean.

The parent of the captain-trainee not flying reported that “his son had told him that the other trainee [the captain-trainee flying the aircraft at the time of the accident] was having difficulty with the upgrade training and ... might not complete the training successfully. His son had spent the evening preceding the accident with the other trainee to help him with the training requirements.”

The captain-trainee and pilot flying, 28, held an airline transport pilot (ATP) certificate and had logged a total of 2,500 hours flying time, of which about 1,200 hours were in the Beech 1900.

The IP, 28, held an ATP certificate and he was type-rated in the Beechcraft 300 and 1900 and Saab 340. He had logged a total of 5,630 flight hours, of which 1,128 hours were in the Beech 1900. The IP was hired by Business Express in September 1986 and was designated a company line-check pilot in 1900s in August 1989.

Air traffic control (ATC) radar data recorded at the Boston Air Route Traffic Control Center showed an aircraft in the vicinity of Block Island between 2113 and 2147 at various altitudes between 300 feet (91 meters) mean sea level (MSL) and 2,500 feet (762 meters) MSL. The report said radar contact with the aircraft was lost at an altitude of 1,900 feet (579 meters) MSL about the time of the crash. The aircraft had been squawking a 1200 VFR transponder code.

Recorded radar data from Boston Center and the Ocean Terminal Radar Approach Control (TRACON) facility near Providence, Rhode Island, were processed and correlated with each other. Radar data and atmospheric data were used in a computer program to calculate aircraft performance data that included roll angles and acceleration loads, which according to the report, should be “used with caution.”

According to the computer calculations, “the aircraft was in level flight between 160 knots and 180 knots indicated airspeed (KIAS) when the last radar return was recorded [at 2146:24]. It was also in a right bank of about 26 degrees, at a magnetic heading of about 236 degrees, and at an altitude of 1,900 feet.”

Based on the last recorded altitude, location, wings-level airspeed of 170 KIAS and crash time coincident with the CVR data (an altitude alert chime at 2146:34), additional computer calculations indicated that the aircraft could have struck the water intact “from a continuous right turn

with the roll angle decreasing from about 75 degrees right wing down and with acceleration loads near 1.7G increasing to about 2.15G at impact. The airplane’s rate of descent would have averaged about 6,800 feet per minute (fpm) [2,074 meters per minute] in the process, and its airspeed would have increased to about 240 KIAS.”

The NTSB noted that the transponder antenna on the aircraft was on the bottom-side of the fuselage and “steeply banked attitudes in a right descending turn probably would have prevented interrogation” of the aircraft’s transponder and accounted for the termination of radar contact at 1,900 feet. The aircraft’s precise attitude when it struck the water at about 2146:49 could not be determined with “precision,” but the NTSB said it “may have been nearly inverted with the outboard section of the wing striking the water first and with the longitudinal axis at a fairly substantial angle with respect to the surface of the water. This attitude probably would have been consistent with a loss of control occurring in a right turn under conditions of thrust asymmetry; that is,

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Final Seconds of a Night Training Flight Beechcraft 1900, N811BE

Time	Source	Content	Time	Source	Content
2145:30	Trainee	<i>and just confirm what altitude I'm still good to ah down to now.</i>	2146:35	IP	<i>stop one thing at a time. You're in a bad situation so correct one thing first.</i>
2145:32	IP	<i>ah two thousand still.</i>	2146:39	IP	<i>nope.</i>
2146:06	Trainee	<i>course looks to be alive.</i>	2146:40	Trainee	<i>whoa.</i>
2146:14	Trainee	<i>and just kinda' skosh in here on the ah little close on the ah my ten mile.</i>	2146:42	Trainee	<i>your aircraft?</i>
2146:17	IP	<i>yeah.</i>	2146:42	IP	<i>no take it.</i>
2146:19	Trainee	<i>I probably should be wary of that.</i>	2146:44	IP	<i>get the bank.</i>
2146:27	Trainee	<i>what altitude am I good down to?</i>	2146:45	IP	<i>power to idle.</i>
2146:29	IP	<i>ah once your established inbound right you're good to what?</i>	2146:46	IP	<i>what are you doin' that for?</i>
2146:34	Trainee	<i>oh [expletive].</i>	2146:46		(sound of landing gear warning horn starts and continues until the end of the recording)
2146:34		(sound of altitude alert chime)	2146:47	IP	<i>all right.</i>
<i>Source: U.S. National Transportation Safety Board</i>			2146:49		(end of recording)

with the left engine/propeller producing relatively high thrust and the right engine/propeller producing little or no thrust to simulate engine failure.”

“The evidence indicates that the trainee’s attitude indicator was intentionally disabled [by opening a circuit breaker], about six minutes after which a failure of the right engine was simulated by retarding the right power lever to flight idle,” the NTSB said. “Further, the evidence indicates that as the trainee maneuvered the airplane to align it for a very high frequency omnidirectional radio range (VOR) approach to runway 28 at Block Island Airport, he became spatially disoriented and asked the IP to take control of the airplane. The IP declined the request, apparently because he failed to recognize the trainee’s severe disorientation and he attempted to coach the trainee through a recovery from an unusual attitude. In the process, the IP lost awareness of the airplane’s altitude and rate of descent and may have become spatially disoriented. As a consequence, the airplane entered an uncontrolled descent and crashed in less than 15 seconds.” The report indicated that spatial disorientation may have occurred when the aircraft was descending through 1,900 feet (579 meters) MSL.

During the accident investigation, several pilots reported that during night flight checks the IP lowered the intensity of the flight instrument lights “on the IP’s instrument panel so that the trainee could not refer to those instruments during a simulated failure of one or more of the trainee’s flight instruments. In response to one trainee’s query about why they practiced partial panel instrument flight when redundant systems were available, the IP responded that he did not like to practice with partial panel flying, but that it was required by the training manual.”

There was nothing in the company operating manual for the aircraft that addressed partial panel instrument flying directly, but the manual clearly stated that, “During training, no multiple emergencies, and in the event of an actual emergency, the simulated emergency will be restored to normal if possible before correcting the actual emergency.”

The report added: “The disablement of the trainee’s attitude indicator without means of covering the indicator, despite the trainee’s specific request, was in itself a significant hazard to the trainee’s spatial orientation because it is difficult to completely ignore the instrument unless it is covered. As a result, the false indications of

airplane attitude as the speed of the indicator's operating gyro slowed would have tended to distract and confuse the pilot."

Failure of an attitude indicator in the Beech 1900 did not constitute an emergency as defined in the pilot's operating handbook because the airplane was equipped with two independently powered attitude indicators. Thus, when the IP simulated failure of the right engine, he technically did not introduce multiple emergencies. "However, by not permitting control of the airplane by reference to the IP's operable attitude indicator, he effectively created multiple emergencies for the pilot trainee ... [which were] contrary to the provisions of the company's Beech 1900 operating manual," the NTSB said.

The report said that the captain-trainee's spatial disorientation occurred "in large part because the IP exercised poor judgment in exposing [the captain-trainee] to a failure of his attitude indicator followed by the simulated failure of the right engine while the captain-trainee was maneuvering the airplane at relatively low speeds and a low altitude on a nonprecision instrument approach on a dark night."

The report said that while technically no company operations policies and procedures were disregarded by the IP, management nevertheless should have devoted more attention and communication to ensure adherence to standard instructional methods and to flight safety. The NTSB said that management relied on the judgment of instructor pilots instead.

"The evidence indicates that company management officials were not well informed about the flight training activities within the company, at least with respect to the Beech 1900 airplane and [U.S. Federal Aviation Regulations] Part 135 training," the NTSB said.

The report said this situation could be partly explained by the lack of a subordinate program manager for the Beech 1900 airplane and the lack of an assistant chief pilot at the company's principal base. (The assistant chief pilot position at the principal base was vacant.) It also said management deficiencies in this regard could be related to the company's rapid expansion in the three years prior to the accident.

"In any event, the result was that all Beech 1900 pilot training activities were apparently delegated to relatively junior IPs, who were relatively new to the company training procedures and who were inexperienced as air carrier check pilots," the NTSB said.

The NTSB concluded that company managers "failed to adequately monitor the Beech 1900 flight training program and failed to recognize that no one was specifically in charge of the training program."

In addition, the NTSB said that Business Express managers and the U.S. Federal Aviation Administration's (FAA) principal operations inspector were not aware that "in effect, multiple simulated emergencies were flown in training and that at least this IP was exercising judgment that seriously jeopardized flight safety by conducting partial panel instrument training at low altitude at night."

The NTSB said Business Express began operations in 1984 and rapidly expanded with the purchase of several commuter airlines. Routes increased significantly in the northeastern United States, the NTSB said.

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According to the NTSB, the company's director of training was qualified in the Saab 340 but not in the Beech 1900. The training director told the NTSB that the company formerly had program directors for each type of aircraft but that the positions had been eliminated in 1990. He said his request a year later that the positions be reactivated was denied by company managers.

"He [the director of training] said that no one was specifically in charge of monitoring the Beech 1900 training program, and no one was assigned to monitor and standardize instructional methods," the NTSB report said.

The report also cited the FAA for failing to adequately monitor the company's flight training programs and for failing to "recognize that management's oversight of and involvement in the Beech 1900 training program were minimal."

Based on its investigation, the NTSB recommended that the FAA:

- Require principal operations inspectors of commuter airlines to verify that appropriate and qualified levels of airline management are actively involved in the airline's flight training programs;
- Encourage commuter airline managers to use approved flight simulators for pilot training, qualification and competency and instrument check purposes to the maximum extent possible; and,
- Consider rules changes to require commuter air carriers to perform certain hazardous training, testing

and checking maneuvers, such as engine-out operations and recovery from unusual flight attitudes, in approved flight simulators to the maximum extent feasible.

The NTSB also recommended that the U.S. Regional Airline Association encourage members to use approved flight simulators for such training.

The report noted that the FAA, responding to other recommendations based on earlier commuter accidents, approved in 1990 the increased use of approved flight simulators for training and competency checks.

The NTSB said that since the accident, Business Express has made plans to conduct most of its Beech 1900 training in simulators. The report said the company had since hired program managers for each model aircraft in its

fleet, coordinated its training flight schedules, and prohibited the opening of circuit breakers to simulate system failures during training flights.

“The Safety Board is aware that many commuter and regional air carriers have had [similar] flight training problems,” the report said. “Because of the lack of airplanes available during daylight revenue operations and the lack of sophisticated flight simulators, much of the training is conducted in airplanes at night.” ♦

This article has been adapted from the 75-page report, NTSB/AAR-93/01/SUM, *Aircraft Accident/Incident Summary Report, Loss of Control Business Express Inc., Beechcraft 1900C N811BE Near Block Island, Rhode Island, December 8, 1991*. Copies of the report can be obtained by contacting the National Technical Information Service, Springfield, VA 22161 U.S. Telephone: (703) 487-4780.

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