



National Transportation Safety Board

Washington, D.C. 20594
Safety Recommendation

SP-20
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In reply refer to: A-86-119 through -122

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The investigations of three recent commuter air carrier accidents have prompted the National Transportation Safety Board's concern about several significant safety issues.

- On August 25, 1985, Bar Harbor Airlines Flight 1808, a Beech Model 99, crashed during an Instrument Landing System (ILS) approach to Auburn-Lewiston Airport, Auburn, Maine. The airplane struck trees at an elevation of 345 feet mean sea level (msl) in a wings level attitude 4,000 feet from the end of the runway threshold and 440 feet to the right of the extended runway centerline; all eight persons aboard were fatally injured. 1/
- On September 23, 1985, Henson Airlines Flight 1517, a Beech B99, crashed during an ILS approach to Shenandoah Valley Airport, Weyers Cave, Virginia. The airplane struck trees at an elevation of 2,400 feet msl in a wings level attitude about 6 miles east of the airport; all 14 persons aboard were fatally injured. 2/
- On March 13, 1986, Simmons Airlines Flight 1746, an Embraer EMB-110P1, crashed during an ILS approach to Phelps Collins Airport, Alpena, Michigan. The airplane struck trees at an elevation of 725 feet msl in a wings level attitude about 1.5 miles from the end of the runway threshold and about 300 feet to the left of the extended runway centerline; three of the nine airplane occupants were fatally injured. 3/

1/ For more detailed information, read Aircraft Accident Report--"Bar Harbor Airlines Flight 1808, Beech B-99, N300WP, Auburn-Lewiston Airport, Auburn, Maine, August 25, 1985" (NTSB/AAR-86/06).

2/ For more detailed information, read Aircraft Accident Report--"Henson Airlines Flight 1517, Beech B-99, N339HA, Shenandoah Valley Airport, Grottoes, Virginia, September 23, 1985" (NTSB/AAR-86/07).

3/ The investigation has not been completed.

All three accidents were scheduled domestic passenger flights operating under 14 CFR 135. The airplanes were in controlled flight at the time of the accidents. All three accidents occurred while the flightcrews were attempting to complete precision instrument approaches in instrument meteorological conditions. None of the flightcrews, all of whom had been in radio contact with an air traffic control facility, indicated that they were experiencing an airplane or equipment problem, and none of the postaccident examinations disclosed airplane or equipment problems which would explain the accidents. Thus, the investigations focused on the performance of the flightcrews, their experience and training, the Federal Aviation Administration's (FAA) oversight of the carriers' training programs, the operating procedures used, the human performance issues of the cockpit environment, the potential safety enhancement provided by ground proximity warning devices, and other safety issues.

Flight Check Standards

Title 14 CFR 135.297(e), with regard to the instrument proficiency check required by paragraph (1), states that a flight check must be performed ". . . under simulated or actual IFR conditions."

Following the Henson Airlines accident, the Safety Board learned that instrument training and proficiency checks were conducted in airplanes in visual meteorological conditions without the use of a vision-restricting device or a hood. The Safety Board is concerned that this practice may not be confined to Henson Airlines alone.

Instrument training should be conducted in a manner closely simulating actual instrument meteorological conditions. In the absence of an approved simulator or an Advanced Training Device (ATD), training in the airplane should be conducted in a manner that will prevent pilots from obtaining visual cues. The practice at Henson Airlines allowed pilots who were receiving instruction or who were being tested to lower their seats rather than to use a vision-restricting device. Since significant visual cues are provided to the pilot by peripheral vision, even if forward vision is somewhat restricted by this practice, this type of training environment is inappropriate and cannot provide an adequate opportunity either to develop instrument flying skills or to demonstrate instrument flying proficiency. Because the Principal Operations Inspector (POI) was aware of and accepted this practice, the Safety Board believes that the FAA should advise POIs to review air carrier training programs to verify that instrument flight training and checks are conducted in a properly simulated manner. Where approved simulators or ATD's are not available, appropriate vision restricting devices should be required.

In its special study 4/ on commuter airline safety, the Safety Board noted:

... pilot training would benefit greatly from increased use of flight simulation. While the number of suitable simulators is limited, they are generally available at aircraft manufacturers' training locations. The Board believes that training at manufacturers' training facilities will provide the most up-to-date simulator flight training. The Board urges the FAA and the commuter industry to encourage the development of sufficient numbers and types of aircraft flight simulators needed to upgrade the quality and scope of commuter airline training.

4/ For more detailed information, read Special Study "Commuter Airline Safety 1970-1979" (NTSB-AAS-80-1).

In light of the three accidents discussed in this letter in which training and pilot competency were issues, the need for the development of flight simulators is becoming increasingly more important so that the quality and scope of commuter airline pilot training may be upgraded.

In part, at the instigation of the Regional Airline Association, the FAA has initiated efforts through its Proposed Advisory Circular, AC No. 120-XX, in proposing standards for the procedures and criteria for use and evaluation of aircraft flight simulators (Advanced Training Devices) under 14 CFR 135. The Safety Board strongly supported the FAA's efforts in its letter dated May 23, 1986 and cautioned that, "the use of Advanced Training Devices (ATD) alone may not result in improved regional airline pilot capabilities. Rather, the use of these devices must be augmented by a comprehensive training program for Part 135 operators."

The Safety Board urges the Regional Airline Association to work with its membership in setting comprehensive industry training standards for initial and recurrent pilot training. The Safety Board has asked the FAA to expedite its program to introduce comprehensive standards on the use of aircraft flight simulators and to work with the industry in acquiring such training devices. Also, the Safety Board urges the Regional Airline Association to encourage and promote the use of flight simulator devices among its membership.

Cockpit Instrumentation and Equipment Standardization

Nonstandardization in cockpit instrumentation and equipment may have had an adverse effect on the performance of the flightcrew in two of the three accidents under discussion.

In the case of Henson Airlines, the company operated eight Beech 99 airplanes. Each was equipped with two fully functional very high frequency (VHF) navigation radios, consisting of a receiver, a control head with frequency selector located in the center of the instrument panel, and a navigational display located on the captain's instrument panel. 5/ Five airplanes were equipped with a third completely independent VHF navigation radio with a navigational display, receiver, control head, and frequency selector located on the first officer's instrument panel; however, three airplanes were equipped with slaved, or partially slaved third VHF navigational displays located on the first officer's instrument panel. The VHF radios were not identical and the navigational displays were not uniformly positioned on the flight instrument panels. More specifically, three airplanes, including the accident airplane, were equipped with two fully functional King radios with the navigational displays on the left side of the captain's panel and one completely independent Narco radio on the lower right side of the first officer's instrument panel. Two other airplanes were similarly equipped, with the exception that the independent Narco radios were on the lower left side of the first officer's panel. Two airplanes were equipped with two fully functional Narco navigation radios with navigational displays on the left side of the captain's instrument panel, and one slaved navigational display on the lower left side of the first officer's instrument panel, which was a repeater of the No. 1 Narco radio. One other airplane was equipped with two King radios on the left side of the captain's panel and one partially independent Narco radio

5/ Navigational displays consist of omnibearing selector (OBS), course deviation indicator (CDI), glideslope (GS), TO/FROM indicators, ON/OFF flags, and a scale to indicate the degree of deflection from the centerline of the selected VOR radial or the localizer and the glideslope.

with its navigational display on the lower left side of the first officer's panel. The partially independent Narco radio had an independent very high frequency omnirange station (VOR) and localizer, but it had a slaved glideslope which was a repeater from the No. 1 King radio. Furthermore, on six airplanes the independent Narco radios on the first officer's side were incapable of receiving aural station identification.

In the case of Bar Harbor Airlines, the operator equipped its Beech 99 fleet with different ILS equipment. Most of the displays (King KI 204s) depicted a five-dot graduation for localizer and glideslope deviations. Some airplanes had installed the KI 214 ILS displays which have a five-dot graduation for localizer deviation but only a three-dot graduation for glideslope deviation. The localizer and glideslope needles of the KI 204 displays move laterally and vertically, respectively, through the instrument face. On the KI 214 display, the localizer needle pivots left or right from the top of the instrument while the glideslope needle pivots up or down from the left side of the instrument. Other airplanes operated by this airline were equipped with Collins navigation radios.

In its investigation of the Henson accident, the Safety Board attached great significance to the fact that some of Henson's Beech 99s had VOR/ILS navigational displays on the first officer's panel that were slaved off the captain's No. 1 radio while others were independent. Thus, the first officer may have thought that she was flying the ILS from the slaved indication off the captain's No. 1 radio, while, in fact, the navigation radio on her side was an independent unit.

Similarly, the different VOR/ILS displays installed in the Bar Harbor fleet, with different graduations and visual characteristics, could have caused confusion with respect to the ILS deviation limits. Since the displacement of the needles of the different displays were not comparable, it is conceivable that the pilot may have been misled to believe that he was closer to the centerline of the localizer and the glideslope parameters than was actually the case.

Major air carriers, pilot groups, and large aircraft manufacturers have been aware of the problems brought about by nonstandard cockpit displays and equipment. Over the years, the emphasis in Part 121 air carrier operations has been to achieve standardization of cockpits throughout a major air carrier's fleet. Many commuter air carriers, however, often are confronted with having to purchase airplanes for their operations as they become available from other operators within the general aviation community or from different airplane manufacturers which have different concepts of and solutions to the human engineering problems presented in the design of airplane cockpits. The Safety Board realizes that total standardization of an air carrier's fleet could present significant, if not prohibitive, economic penalties. Nevertheless, the Safety Board believes that the lack of cockpit standardization is a hazard to flight safety and must be addressed by the FAA and the commuter industry. The Safety Board has asked the FAA to provide guidance to commuter air carrier operators regarding the benefits to be derived from cockpit standardization with respect to flight safety and require that pilots be trained in the differences in cockpit instrumentation and equipment and the human performance problems associated with nonstandard cockpit design. The Safety Board urges the Regional Airline Association to encourage its membership to standardize instrumentation displays and equipment installation in their aircraft to the greatest possible extent.

Pilot Experience, Cockpit Coordination, and Pilot Scheduling

In all three accidents, the pilots were relatively new to their positions in the cockpit. In the Henson and the Simmons accidents, the captains had been with the company for about a year and had been upgraded only recently to captain; both first

officers had been with the company less than 2 months. In the Bar Harbor accident, the captain had been with the company for about 15 months, a captain for about 1 year, and in his position as captain of a Beech 99 for about 3 months; the first officer had joined the carrier only 3 months before the accident.

The Safety Board believes that the safe conduct of these three flights may have been compromised by a lack of coordination in the cockpit. Little time was devoted to cockpit coordination during training. In fact, most "training" occurred on the job. Consequently, compromises in the decision making processes and in cockpit coordination may have been factors in all three accidents because of the low-time experience of at least five of the six pilots.

Title 14 CFR 135.225(d) states:

The [minimum descent altitude] or [decision height] and visibility landing minimums prescribed in Part 97 of this chapter or in the operator's operations specifications are increased by 100 feet and 1/2 mile respectively, but not to exceed the ceiling and visibility minimums for that airport when used as an alternate airport, for each pilot in command of a turbine-powered airplane who has not served at least 100 hours as pilot in command in that type of airplane.

In the current era of rapid pilot turnover and the hiring of less experienced pilots in the commuter industry, a solution to problems related to inexperience could be to request commuter airlines to schedule flightcrews so that relatively inexperienced captains are teamed with experienced first officers and that inexperienced first officers only be scheduled to fly with senior captains. The Safety Board urges the Regional Airline Association to encourage its membership to institute scheduling policies that would tend to preclude the scheduling of inexperienced flightcrews on the same flight.

Therefore, the National Transportation Safety Board recommends that the Regional Airline Association:

In cooperation with the Federal Aviation Administration, develop comprehensive industry standards for initial and recurrent pilot training programs. (Class II, Priority Action) (A-86-119)

Work with its membership to encourage the use of flight simulators or Advanced Training Devices in the pilot training programs of commuter airlines. (Class III, Longer-Term Action) (A-86-120)

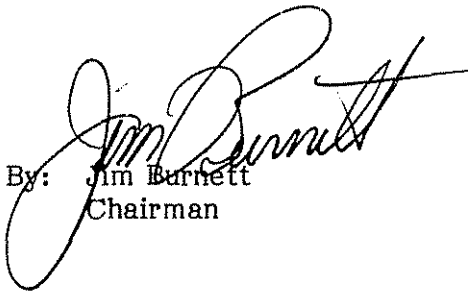
Encourage its membership to provide, to the greatest extent possible, standardization of instrumentation and equipment in the cockpits of their airplane fleets. (Class II, Priority Action) (A-86-121)

Encourage its membership to institute a policy of pilot scheduling which would prevent the scheduling on the same flight of cockpit crewmembers with limited experience in their respective positions. (Class II, Priority Action) (A-86-122)

Also, the Safety Board issued Safety Recommendations A-86-98 through -118 to the Federal Aviation Administration.

The National Transportation Safety Board is an independent Federal agency with the statutory responsibility ". . . to promote transportation safety by conducting independent accident investigations and by formulating safety improvement recommendations" (Public Law 93-633). The Safety Board is vitally interested in any actions taken as a result of its safety recommendations and would appreciate a response from you regarding action taken or contemplated with respect to the recommendations in this letter. Please refer to Safety Recommendations A-86-119 through -122 in your reply.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER and NALL, Members, concurred in these recommendations.


By: Jim Burnett
Chairman