AIRCRAFT ACCIDENT REPORT
MONMOUTH AIRLINES, INC.
Scheduled Air Taxi
Beech 99, N-986MA
Allentown-Bethlehem-Easton Airport
Allentown, Pennsylvania
October 24, 1971

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
REPORT NUMBER: NTSB AAR 72-3

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Beech 99, N-986MA
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Adopted: DECEMBER 29, 1971

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16. Abstract

An accident occurred on October 24, 1971, when Monmouth Airlines, Inc., scheduled air taxi service, a Beech 18, N300MA, crashed at approximately 11:35 A.M. at the Allentown-Bethlehem-Easton Municipal Airport, Allentown, Pa. The aircraft was being operated by pilot, flight engineer, and two passengers.

The accident occurred on a north-south runway of the airport at V/STAD, a rolling, fifth class airport. The accident was north of the airport.

The report concludes that the cause of the accident was fatigue. The aircraft was operated by pilot, flight engineer, and two passengers.

The report further concludes that the cause of the accident was a result of the pilot's fatigue. The pilot's fatigue was caused by a combination of factors, including the pilot's age, the time of day, and the duration of the flight.

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MONEOUTH AIRLINES, INC
SCHEDULED AIR TAXI
BEECH 94, N986MA
ALLENTOWN-BETHLEHEM-EASTON AIRPORT
ALLENTOWN, PENNSYLVANIA
OCTOBER 24, 1971

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SPECIAL NOTICE

This report contains the essential items of information relevant to the probable causes and safety messages to be derived from this accident. However, for those having a need for more detailed information, the original factual report on the accident is on file in the Washington office of the National Transportation Safety Board. Upon request the report will be reproduced commercially at an average cost of $1.00 per page for printed matter and 75c per page for photographs, plus postage. (Minimum charge $1.00.)

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: December 23, 1971

MONMOUTH AIRLINES, INC.
SCHEDULED AIR TAXI
BEACH G-9, N-8939A
ALLENTOWN-BETHLEHEM-EASTON AIRPORT
ALLENTOWN, PENNSYLVANIA
OCTOBER 24, 1971

SYNOPSIS

At approximately 2:30 p.m., October 24, 1971, Monmouth Airlines, Inc., scheduled air taxi Flight 61, a Beech Model G-9, N-8939A, crashed at approximately the 1,500-foot level of Blue Mountain during an instrument approach to the Allentown-Bethlehem-Easton Airport, Allentown, Pennsylvania.

The captain, a pilot, and two passengers were fatally injured. The four remaining passengers were seriously injured.

The National Transportation Safety Board determines that the probable cause of this accident was the pilot's inattention to approved approach procedures for a nonprecision approach in instrument flight conditions. The Board further finds that there is a high degree of probability that the unusual attitude the actual instrument flight approach to this accident resulted in the fatigue of both pilots, and affected their judgment and decisions during the approach.

The Board made specific recommendations to the Federal Aviation Administration in connection with this accident. See Attachment C for detailed information regarding the Board's recommendations and the FAA's reply.
INVESTIGATION

Monmouth Airlines, Inc., based at the Monmouth County Airport, Farmingdale, New Jersey, operates numerous scheduled air taxi flights in Northeastern United States.

Monmouth Airlines Flight 98 (Monmouth 98) of October 24, 1971, originated at Wilkes-Barre-Scranton Airport, Pennsylvania, and was to have terminated at the Allentown-Bethlehem-Easton Airport (ABE), Allentown, Pennsylvania. The flight departed Wilkes-Barre-Scranton at 2253/1 with two pilots and six passengers, on an Instrument Flight Rules (IFR) clearance to the ABE Airport. The routing was "direct" to the Allentown VORTAC 2/ to maintain 4,000 feet.3/

At 2301, two-way radio contact was established between Monmouth 98 and Allentown Approach Control. During this initial radio contact, Monmouth 98 was given the current weather and altimeter setting and advised that a choice of approaches to the Allentown ABE Airport was available. ABE Airport has facilities for both a VOR and ILS 4/ approach. Monmouth 98 requested a VOR approach. The flight then was instructed by Allentown Approach Control to report when it was 12 miles north of the Allentown VOR.

At 2305, Monmouth 98 advised that the DME aboard the aircraft was not working too well and that it would be necessary to use the 030° radial of the East Texas VOR to establish a position 12 miles north of the Allentown VORTAC. Allentown Approach Control then asked Monmouth 98, "how far out do you think you are?" Monmouth 98 replied that it was estimating Allentown in about 6 minutes. At 2307, upon receiving the flight's position estimate, Allentown Approach Control cleared Monmouth 98 for a VOR approach to a landing on Runway 6. Monmouth 98 was requested to report when inbound over the Allentown VOR. Monmouth 98 acknowledged the clearance. This was the last known radio contact with the flight.

The wreckage of Flight 98 was located about on the 360° radial of the ABE VORTAC, on the ridge of Blue Mountain near latitude 40° 43' 10" N. and longitude 75° 29' 45" W. The terrain elevation of the accident site is approximately 1,540 feet. Blue Mountain is a rolling ridge with ridge top elevation varying between 1,500 and 1,600 feet. The ridge runs

1/ All times herein are eastern daylight based on the 24-hour clock.
2/ VORTAC - A collocated Very High Frequency Omni Range Station (VOR) and Tactical Air Navigation aid. These facilities are capable of providing distance information as well as azimuth to aircraft having distance measuring equipment (DME) on board.
3/ All altitude and terrain elevations are mean sea level.
4/ ILS - Instrument Landing System
in a generally east-west direction and is located 11 miles north of the 
ABE Airport and 5 1/2 miles north of the Allentown WORC'S.

Broken tree limbs and various aircraft components, including the 
outboard sections of both wings, portions of the horizontal tail sur-
faces, and the right engine, were distributed for 370 feet along a yirth
of 130° magnetic.

Impact and fire damage precluded reliable documentation of the 
operation of any cockpit instruments except a clock and one of two alti-
ometers. The damaged clock was stopped at 11:14.

A laboratory examination of the altimeter disclosed a setting of 
30.02. Severe internal damage precluded a determination of preimpact 
operating capability.

The altimeter setting that was transmitted to the crew during the 
approach was 30.05.

The horizontal stabilizer was set between 2.62° and 2.87° leading 
edge up and the landing flaps were extended 66 percent. These settings 
were compatible with an instrument approach configuration.

There was no evidence of a preimpact malfunction of the airframe, 
powerplants, or associated components.

The powerplants, airframe, and associated components revealed 
nothing that would have contributed to mechanical malfunction prior to 
impact. All electronic navigational equipment and instrumentation was 
damaged by fire to the extent that meaningful determination of preimpact 
operating conditions, frequencies, or OMA I-bearing selector settings 
could not be made.

The maintenance records indicated that the aircraft had been main-
tained in accordance with Federal Aviation Regulations and company 
procedures and requirements.

Reported weather conditions at the Allentown ABE Airport at 2250 
on October 24, 1971, were: scattered clouds at 500 feet, measured ceiling 
800 feet, overcast, visibility 5 miles, light rain and fog, temperature 
59°, dew point 59°, wind 090° at 12 knots, altimeter setting 30.05.

The Allentown ABE Airport is located on the north side of the tri-city 
metropolitan complex of Allentown, Bethlehem, and Easton, Pennsylvania. 
The Allentown Queen City Municipal Airport is located south of the cities.

The Queen City Municipal Airport is close to the ABE Airport, and 
des has a VOR I approach plate with peculiar similarity to the ABE VOR I approach 
plate. The Queen City VOR I approach utilizes the East Texas VOR facility
for the approach to Queen City Airport. The ARS VOR-1 approach utilizes the Allentown VOR facility for the approach to ARP. However, the minimum altitude for the final approach fix for the Queen City Airport is 1,800 feet, whereas the minimum altitude for the final approach fix for the ARP approach is 2,000 feet. Both of these approach plates were fixed together in the same approach plate binder utilized in Kenneth Airlines.

(See Attachment B for approach details and charts for each facility.)

The surviving passengers reported that there was no indication of the impending accident on the flight from Allentown to Atlanta. According to their statements, the curtains separating the cabin from the passenger compartment were closed before the takeoff from Allentown. Hence, they were unable to observe the crew's activity during the flight. They said that although the flight was very rough, the sound of engine noise seemed normal. Just before impact, they saw the exception of being suddenly expelled very hard into their seats, followed immediately by a strong and bursting sound. They said that the aircraft caught fire shortly after coming to rest and that there were several explosions during the ensuing fire which destroyed the aircraft and cabin area. The surviving passengers were still trapped in their seats after the flames had gone. They were able to escape the aircraft before the fire reached the cabin area.

On the day of the accident, the crew had been on a 12-hour tour of duty and had flown a 10-hour flight in Allentown Instrument Flight Rules. At an altitude of 4,000 feet, one of the engines was heard to sound rough and the captain called his wife to inform her that he was not sure if they were going to make it. A mechanic that was on duty at the time reported seeing a spark and seeing delays in the schedule back-up day.

The crew was properly certified and had a valid commercial pilot certificate and a valid medical certificate. The aircraft had been maintained by an FAA-approved repair station.

Investigation of the accident revealed evidence of pre-existing damage to the aircraft.

EXHIBITS AND COPY

Exhibit 1 (Note: Not shown) - The cockpit record contains details on the departure point of the airplane, unexpected weather, and the weather in the vicinity of the airport.

Exhibit 2 (Note: Not shown) - The airplane's maintenance record shows that maintenance was performed at least twice in the past 30 days, one of which was performed by the Allentown GA.

...
No evidence of preimpact failure or malfunction of the aircraft, powerplants, controls, associated systems, or components was found.

In view of the post-mortem findings, the Safety Board believes that the captain's failure to have a currently valid medical certificate was not a contributing factor in this accident. However, the long on-duty hours, and the considerable number of hours of flight under instrument flight rules conditions, may well have resulted in fatigue for both pilots, which affected their judgment and decisions during the instrument approach to the ABE Airport.

A direct flight from Wilkes-Barre to the Allentown VOR/NAV will result in a flight path of about 140° magnetic. This is also the inbound heading for the VOR-1 approach to the ABE Airport.

Since the flight had been cleared from Wilkes-Barre direct to ABE, the pilot likely would have established course on the Allentown 360° radial utilizing the Allentown VOR/NAV. Hence, in referring to the approach chart, the pilot's concern might have been the minimum altitude over the final approach fix. According to the Allentown Approach Control Communication transcript, the pilot and the 10° radial of the East Texas VOR by alternately a 20-mile position north of the Allentown VOR/NAV because of the required operation of the ILS. That the 12-mile fix was not included in advance is the pilot's negotiation of the immediate estimate for the fix. It was possible that at this point, as a result of fatigue, the pilot did not have a clear reference to the fix. Instead of the ABE Airport, the pilot elected to take a direct flight and clear the ABE Airport without proceeding to the VOR or to the Allentown VOR/NAV, of executing the procedure as required. In this circumstance, the Allentown VOR/NAV City VOR/NAV was not available to determine the minimum altitude. Prior to executing the final approach fix, the aircraft would have been designated to descend for a gauge of the present altitude of 2,000 feet as shown on the flight instruments and a chart. (See Attachment B.) The descent would have been at a descent rate between 300 and 500 feet per minute.

The possibility of reducing the altimeter as a cause was considered. However, there was no indication in the records that the pilot would have been allowed to descend into a cloud at the desired altitude.
Had the correct procedure been followed, there would have been several opportunities for the crew to become aware of an altimeter misreading or the unintentional use of the wrong approach chart.

The Board also considered the possibility of erroneous station passage depiction by the VOR course indication needle. It is realized that if needle fluctuation occurred it could be interpreted as station passage. However, since impact occurred some 5 1/2 miles from the VOR/RNAV, the "to-from" feature of the VOR receiver instrumentation should have shown a steady indication of flight "to" the station. The "to-from" indicator is the primary means of determining station passage.

The damaged condition of the cockpit instruments precluded a meaningful determination of the VOX receivers' functional operating capabilities or other evidence that would support a VOX course indicator malfunction.

**Probable Cause**

The National Transportation Safety Board determines that the probable cause of this accident was the pilot's nonadherence to approved approach procedures for executing a nonprecision instrument approach in instrument flight conditions. The Board further finds that there is a high degree of probability that the excessive on-duty time and actual instrument flight time prior to this accident resulted in the fatigue of the pilots, and affected their judgment and decisions during the approach.

**Recommendations**

The Board recommended that the Federal Aviation Administration:

1. Require some conspicuous and distinctive marking to be affixed to the Allentown approach plates to enable pilots to identify the proper plate quickly and positively. The words "CAUTION -- VERIFY PROPER APPROACH" or similar phraseology may be appropriate.

2. Promptly review all instrument approach plates to determine instances of potential approach plate misidentifications in other locations, and if found, institute the same remedial action.

3. As an interim measure, notify the public of this potential hazard by whatever means you deem most expediteous and effective.
See Attachment C for detailed information regarding the Board's recommendations and the FAA's reply.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ OSCAR M. LAUREL
Member

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

December 29, 1971
CREW HISTORY

Captain Richard S. Ricotta, aged 28, held Airline Transport Pilot certificate number 1736863. His first-class medical certificate, with no limitations, was dated June 30, 1970. A first-class medical certificate is valid for 12 months from the date of issue for the exercise of commercial pilot privileges.

Captain Ricotta completed his Federal Aviation Administration (FAA) competency check to pilot a Beech 99 aircraft under FAA conditions on October 7, 1971.

The copilot, James Richard Crawford, aged 25, held Commercial Pilot's certificate number 1669226, with flight instructor, instrument, single- and multiengine land, and rotocraft ratings. Mr. Crawford held a current first-class FAA medical certificate, with no limitations, dated February 25, 1971.

Copilot Crawford was regularly employed by the New York City Police Department as a helicopter pilot. His association with Monmouth Airlines included voluntary flying as a copilot on an infrequent basis. At the time of the accident it was the policy of Monmouth Airlines to use co-pilots who agreed to fly for the experience without other compensation.
SAFETY RECOMMENDATION A-71-60 thru 62

On October 24, 1971, an aircraft crashed while executing a VOR instrument approach to the Bethlehem-Bashont Airport, Allentown, Pennsylvania. This accident resulted in four fatalities and four serious injuries. Preliminary investigation of the accident and a review of the VOR approach procedures for the Allentown area indicate that the VOR approach plates may have been a factor in this accident.

The aircraft crashed 10 miles north of the airport and 5 miles north of the Allentown VOR at an altitude of 1,600 feet mean sea level (m.s.l.). In an attempt to ascertain why the aircraft was at that altitude, at that point, the VOR approach plates were reviewed closely. It was noted that 1,600 feet m.s.l. is the low station altitude for the Allentown VOR approach to the Queen City Municipal Airport, utilizing the East Texas VOR. The VOR approach to the Bethlehem-Bashont Airport, using the Allentown VOR, has a low station altitude of 2,200 feet m.s.l.

Since both instrument approach plates are entitled "VOR-1" and have the word Allentown twice in proximity thereto, it is entirely possible that haste, poor lighting, or other factors might have caused the pilots to select the wrong approach plate for the approach they were conducting. Thus, when the aircraft was cleared for the approach and erroneously descended to 1,600 feet m.s.l., there was inadequate terrain clearance, and the ensuing accident was inevitable.
Honorable John H. Shaffer

In light of the foregoing, it is the opinion of the National Transportation Safety Board that some method must be instituted to preclude, insofar as possible, selection of the improper instrument approach plate. To this end, the Board recommends that you administer:

1. Require some conspicuous and distinctive markings to be affixed to the Allentown approach plate(s) to enable pilots to identify the proper plates quickly and positively. The word "CAUTION-VERIFY PROPER APPROACH" or similar procedure may be adequate.

2. Promptly review all instrument approach plates to determine instances of potential approach plate misidentification in other locations, and if found, institute the same remedial action.

3. As an interim measure, notify the public of this potential hazard by whatever means you deem most expeditious and effective.

Members of our Bureau of Aviation Safety will be available for consultation in this matter if desired.

This recommendation will be released to the public on the date shown above. No public dissemination of the existence of this document should be made prior to that date.

Boyd, Chairman; Lane, Wabans, Paton, and Moore, Members, concurred in the above recommendation.

\[Signature\]
26 Nov 1979

Renee D. J. N. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D.C., 20591

Dear Mr. Chairman:

This is in response to your Safety Recommendations A-71-60 through 62 dated 17 November 1971 concerning a Monarch Air Lines accident in the vicinity of Allentown, Pennsylvania.

The conditions cited in your recommendations have been reviewed. Based on available information, we do not consider that the VOR approach plates were a contributing factor in this accident nor do we consider that the recommended actions are appropriate.

The NTSB has based their recommendations on the premise that the pilot may have selected the wrong VOR approach plate due to some similarity between the airport names, bases on the part of the crew, or poor lighting.

Our study of the ATC recordings indicates that the pilot was fully aware of his position, the navigation facilities he was utilizing and that he was familiar with the destination airport. The pilot reported that he would utilize the best Trans VOR 056° radial to report his position 8 miles north of the Allentown VOR. He also reported that he wanted a VOR approach to the north of the airport. He was subsequently cleared for the VOB approach, to land on runway 6 with instructions to report at the 8 mile point. In order to make a VOR approach utilizing either approach plate, a pilot must proceed to the VOR by airways at MEA and execute a procedure turn, since RADAR is not available and a straight-in without a procedure turn is not authorized. If the pilot selected the wrong approach chart, he would be required to make a procedure turn on the 056° radial, and the crash site which was approximately 5 miles north of the Allentown VOR does not substantiate this theory.

In view of the pilot's voice transmissions and the location of the crash site, we do not believe that he utilized the incorrect chart, that he was planning his approach in haste, or that he was having any mental difficulties.
In summary, this was a routine, scheduled air taxi operation. The pilot flew regularly into the Allentown, Bethlehem-Easton Airport and was familiar with the route and airport environments; therefore, the information available to the FAA does not support the action recommended by the Board.

Sincerely,

(signed) Jack
J. H. Shaffer
Administrator