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PB-239 891

# AIRCRAFT ACCIDENT REPORT: AIR EAST, INCORPORATED. BEECHCRAFT 99A, N125AE, JOHNSTOWN-CAMBRIA COUNTY AIRPORT, JOHNSTOWN, PENNSYLVANIA, JANUARY 6, 1974

National Transportation Safety Board
Washington, D. C.

15 January 1975 AAR 75-3
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16. Abstract About 1905 e.s.t. on January 6, 1974, Commonwealth Commuter Flight 347, an Air East, Inc., Beechcraft 99A, crashed while making an instrument approach to runway 12 at the Johnstown-Cambria County Airport, Johnstown, Pennsylvania. Of the 15 passengers and 2 crewmembers aboard, 11 passengers and the captain were killed in the crash. The four remaining passengers and the first officer were seriously injured. The aircraft was destroyed.

While on an instrument landing system localizer approach, the aircraft struck approach lights about 400 feet from the runway threshold and then crashed into an embankment about 200 feet from the threshold. Shortly before and shortly after the accident, the reported weather conditions at the Johnstown Airport consisted in part of variable 200- to 400-foot ceilings and a prevailing visibility of 2 miles in very light snow and fog.

The National Transportation Safety Board determines that the probable cause of this accident was a premature descent below a safe approach slope followed by a stall and loss of aircraft control. The reason for the premature descent could not be determined, but it was probably the result of: (1) A deliberate descent below the published minimum descent altitude to establish reference with the approach lights and make the landing, (2) a visual impairment or optical illusion created by the runway/approach lighting system, and (3) downdrafts near the approach end of the runway.

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# AIRCRAFT ACCIDENT REPORT

AIR EAST, INC.

BEECHCRAFT 99A, N125AE

JOHNSTOWN - CAMBRIA COUNTY AIRPORT

JOHNSTOWN, PENNSYLVANIA

JANUARY 6, 1974

ADOPTED: JANUARY 15, 1975

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
REPORT NUMBER: NTSB -AAR-75-3

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Adopted: January 15, 1975

AIR EAST, INC.
BEECHCRAFT 99A, N125AE
JOHNSTOWN - CAMBRIA COUNTY AIRPORT
JOHNSTOWN, PENNSYLVANIA
JANUARY 6, 1974

## SYNOPSIS

About 1905 e. s. t. on January 6, 1974, Commonwealth Commuter Flight 317, an Air East, Inc., Beechcraft 99A, crashed while making an instrument approach to runway 33 at the Johnstown-Cambria County Airport, Johnstown, Pennsylvania. Of the 15 passengers and 2 crewmembers aboard, 11 passengers and the captain were killed in the crash. The four remaining passengers and the first officer were seriously injured. The aircraft was destroyed.

While on an instrument landing system localizer approach, the aircraft struck approach lights about 300 feet from the runway threshold and then crashed into an embankment about 200 feet from the threshold. Shortly before and shortly after the accident, the reported weather conditions at the Johnstown airport consisted in part of variable 200- to 400-foot ceilings and a prevailing visibility of 2 miles in very light snow and fog.

The National Transportation Safety Board determines that the probable cause of this accident was a premature descent below a safe approach slope followed by a stall and loss of aircraft control. The reason for the premature descent could not be determined, but it was probably the result of: (1) A deliberate descent below the published minimum descent altitude to establish reference with the approach lights and make the landing, (2) a visual impairment or optical illusion created by the runway/approach lighting systems, and (3) downdrafts near the approach end of the runway.

## 1. INVESTIGATION

### 1.1 History of the Flight

Commonwealth Commuter Flight 317, an Air East, Inc., Beechcraft 99A, N125AE, was a scheduled passenger flight between the Greater Pittsburgh International Airport, Pittsburgh, Pennsylvania, and the Johnstown-Cambria County Airport, Johnstown, Pennsylvania. On January 6, 1974, Flight 317 departed Pittsburgh about 1830 [1/] with 15 passengers and 2 crewmembers aboard.

Except for an inoperative encoding transponder and inoperative distance measuring equipment (DME), Flight 317 proceeded to Johnstown at an assigned altitude of 6,000 feet [2/] without any reported problems. According to the first officer, moderate icing was encountered en route; but the deicing equipment removed the ice from the areas of the aircraft protected with ice removal equipment.

At 1849, the controller at the Cleveland air route traffic control center cleared Flight 317 for an instrument approach to Johnstown. About 2 minutes later, he cleared the flight to contact Johnstown Radio. [3/]

About 1851, Flight 317 contacted the Johnstown Radio air traffic specialists and informed him that the flight had been cleared for an approach to Johnstown. The specialist acknowledged the clearance and gave Flight 317 the airport advisory information: "Wind 280° at 12 kn., favoring runway 33, altimeter 29.80 in., runway sanded, weather -- estimated ceiling, 300 feet variable overcast, visibility-2 miles in very light snow and fog. Ceiling variable between 200 and 400 feet." He requested that Flight 317 report passage of the compass locator outbound and inbound.

About 1856, Flight 317 reported passing the compass locator outbound on the instrument landing system (ILS) localizer approach to runway 33. About 3 minutes later, the flight reported passing the same

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1/ Unless otherwise indicated, all times herein are eastern daylight based on the 24-hour clock.

2/ All altitudes herein are mean sea level (m. s. l.) unless otherwise indicated.

3/ Johnstown Flight Service Station (FSS), which is located on the Johnstown Airport.

fix inbound to the airport. According to the FSS specialist, Flight 317 reported about 1901 that the approach and runway lights were in sight, and about 1904, the flight requested that the approach lights be dimmed. The specialist dimmed the lights and transmitted the surface wind velocity and altimeter setting. In response to his transmission, the specialist heard several clicks of a transmitter. There were no further communications from Flight 317.

After completing his last transmission to Flight 317, the FSS specialist attended to other matters in the station. Sometime later, an Air East ramp agent asked if the specialist had radio communication with Flight 317. The specialist replied that he had been communicating with the flight. He attempted without success to reestablish communications with Flight 317. He called Cleveland Center and Altoona Radio on land lines and asked if the controllers there had radio communication with Flight 317. Their replies were negative.

The Air East agent began a search of the airfield. After looking around the departure end of runway 33, he drove toward the approach end. Near the latter location, he encountered a young man who told him that an airplane had crashed on the embankment near the approach end of runway 33. The Air East agent drove to the FSS and informed the specialist of the accident. The latter notified the police department, and rescue activities began.

There were no eyewitnesses to the accident on the ground. Two witnesses near the passenger terminal saw landing lights off the approach end of runway 33 about the time that Flight 317 was near that location. They described the surface winds as, "very windy at times" and "gusting" with visibility obstructed by "haze" and "blowing light snow."

The first officer stated that the captain was flying the aircraft on a normal approach, and that after they had passed the compass locator, inbound to the airport, the aircraft descended at a rate of 300 to 400 fpm and was below the clouds between the altitudes of 3,000 feet and 2,900 feet. At that time, he could see the approach lights and the airport about 3 to 4 miles ahead. When they were about 3/4 mile from the runway, or just before flying over the approach lights, he asked the FSS specialist to "turn the lights down." After the lights were dimmed, he recalled completing the landing checklist, calling out 100 feet above the field elevation, and seeing 115 to 120 knots on the airspeed indicator. Then, while laying his checklist on the floor, he felt the aircraft begin to sink rapidly. He reached for the throttle levers but found that the captain had already advanced them. He felt the control wheel move aft and believed that the aircraft was in a nosehigh attitude. His next recollection was being on the ground outside the aircraft.

The first officer could not recall having heard the stall warning horn. He stated that he believed that the stall warning system was inoperative because ice covered the area of the wing leading edge where the vane of the lift transducer was located.

The first officer described the captain as a perfectionist who "went by the book in everything he did." He added that, lately, the captain had developed a habit of making approaches at lower than prescribed airspeeds--airspeeds as low as 93 and 95 KIAS. When asked if the captain had used this technique on the night of the accident, the first officer replied, "He could have been. I don't recall if he was or not, but possibly."

The accident occurred during the hours of darkness about 1905 on January 6, 1974. The geographic coordinates of the accident site are 40° 18' 40" N latitude and 78° 50' W longitude.

1.2 Injuries to Persons

| Injuries | Crew | Passengers | Other |
|---|---|---|---|
| Fatal | 1 | 11 | 0 |
| Nonfatal | 1 | 4 | 0 |
| None | 0 | 0 | |

1.3 Damage to Aircraft

The aircraft was destroyed.

1.4 Other Damage

Four approach lights were destroyed

1.5 Crew Information

The captain of Flight 317 completed his initial training with Air East on July 8, 1973. His records indicated that he received the initial qualification check required by 14 CFR 135.138 from the designated company check pilot the following day. However, the check pilot testified that the check had been given by the company's vice president for operations.

The captain passed a route check on August 15, 1973, and he passed an instrument check given by an FAA check pilot on September 9, 1973. This check, which met the requirements of 14 CFR 135.131, was given in a Beechcraft 99A, and included ground handling maneuvers, takeoffs, and landings.

The first officer completed his initial training with Air East on July 8, 1973. His records indicated that he received the initial qualification check required by 14 CFR 135.138 the following day. However, the company check pilot stated that the check was also given by the vice president for operations, who requested that the check pilot sign the check form certifying the first officer's competency. The check pilot signed the form, but stated that he gave the first officer the equivalent of a check ride on a nonrevenue flight several days later.

The training records indicated that both pilots had received the required ground training. The captain and first officer had been off duty about 23 hours and 16 hours, respectively, before they reported for duty on the day of the accident. (See Appendix B.)

1.6 Aircraft Information

N125AE, a Beechcraft 99A, was owned and operated by Air East, Inc. It had accumulated a total time in service of 7,503.4 hours. The maintenance records showed that the aircraft had been maintained in accordance with FAA regulations and approved company procedures. The records indicated that all applicable airworthiness directives had been complied with. (See Appendix C.)

The maintenance logs for N125AE reflected that the DME and No. 2 transponder were inoperative and had been inoperative since December 28, 1973.

The maximum certificated takeoff and landing weight for N125AE was 10,400 lbs. The center of gravity (c.g.) limits with the landing gear extended were 179 in. maximum forward, and 195 in. maximum aft.

By using standard weights for passengers, crew, fuel, and baggage, the takeoff gross weight of N125AE at Pittsburgh was computed to have been 10,797 lbs., or 397 lbs. over the maximum allowable weight. The load manifest [4/] that was filled out by the first officer en route to Johnstown showed only 806 lbs. of fuel aboard at Pittsburgh instead of the 1,203 lbs., which was actually aboard. Also, the load manifest showed a gross weight of 10,391 lbs.

4/ The original load manifest on file at Pittsburgh was lost and couldn't be found; according to the first officer, it showed only 14 passengers aboard Flight 317.

The first officer and other former Air East pilots testified that it was a regular company practice to enter low fuel weights on the load manifests when a maximum load (15) of passengers were aboard. The low fuel weights were entered to show that the aircraft was within weight and balance limits. They also stated that passenger seats were never restricted from use to keep the aircraft within weight and balance limits. It was an unwritten company policy to accept additional passengers and to fly the aircraft overweight and out of c. g. limits, if necessary.

Using the actual weights of the passengers and baggage, N125AE's gross weight at takeoff was computed to have been 10, 342 lbs. The landing weight was calculated at 10, 088 lbs. with the c. g. located 1. 12 in. aft of the maximum allowable.

According to the first officer, before the aircraft departed Pittsburgh, the aircraft had significant formations of ice on the areas that were not protected with deicing equipment. He removed some of the ice with his hands, but the aircraft was not deiced by fluid or by other means.

1. 7 Meteorological Information

Special surface weather observations taken at Johnstown at the times indicated were reported as follows:

1854 - Estimated ceiling-300 feet variable overcast, visibility-2 miles, very light snow, fog, temperature-26° F, dew point missing, wind-280° at 14 kn., altimeter-29. 80 in., ceiling-200 ft. variable to 400 ft.

1915 - Conditions were the same as those at 1854, except the dew point was 25°F and the wind was 280° at 12 kn.

The 2000 winds aloft observation at Pittsburgh was as follows:

| Altitude (feet m. s. l.) | Direction (true) | Speed (kn.) |
|---|---|---|
| 2,000 | 250° | 18 |
| 3,000 | 250° | 25 |
| 4,000 | 250° | 26 |
| 6,000 | 260° | 33 |

The National Weather Service does not issue terminal forecasts for Johnstown. AIRMET 5/ Charlie 2 was in effect for Pennsylvania at the time of the accident. It forecast occasional moderate icing in clouds and precipitation, with local ceilings and visibilities below 1,000 feet and 3 miles in light snow and fog; higher terrain was to be obscured occasionally.

The Johnstown FSS specialist was also a certificated weather observer. He took both the 1854 and 1915 observations. He estimated the ceiling height with the aid of a ceilometer and estimated the visibility with the aid of various landmarks surrounding the airport. He stated that the visibility to the southeast could have been more than 2 miles, but that the prevailing visibility was 2 miles.

## 1.8 Aids to Navigation

Runway 33 at Johnstown was equipped with an ILS localizer only approach capability. A very high frequency omni-range station (VOR) with DME is located on the airport. A complete ILS facility was commissioned for use on runway 33 on March 28, 1974.

The elevation of the touchdown zone of runway 33 is 2,281 ft., and the elevation of the threshold is 2,272 ft. An obstruction (hilltop) almost directly on the localizer course and about 4.6 miles from the threshold of runway 33 rises to an elevation of 2,640 ft. The minimum descent altitude (MDA) for the localizer approach was 2,940 ft., or 659 feet above the elevation of the touchdown zone.

A low frequency compass locator beacon and a very high frequency (VHF) marker beacon were collocated on the localizer course 6.9 miles from the threshold of runway 33. A VHF middle marker (MM) was located 0.4 mile from the threshold. (See Appendix D.)

The ILS was flight tested the day after the accident. All components operated with prescribed tolerances.

## 1.9 Communications

The Johnstown Airport is not equipped with any air traffic control facilities. The Johnstown FSS provides an advisory service only to landing and departing aircraft. There were no problems with air-to-ground communications.

5/ An in-flight weather advisory concerning weather phenomena that is potentially hazardous to aircraft having limited instrumentation and equipment.

## 1.10 Aerodrome and Ground Facilities

The Johnstown Airport is operated by the Johnstown-Cambria County Airport Authority. Air East, Inc., provided airport maintenance by contract with the Airport Authority. Air East also provided fixed-base operator services on the airport.

The airport is equipped with three hard-surfaced runways. Runway 33, the longest, is 5,488 feet long and 150 feet wide. It has a macadam surface. The airport elevation is 2,284 feet.

Runway 33 is equipped with high intensity runway lights (HIRL) and a medium intensity approach lighting system with runway alignment indicator lights (MALSR).

The approach lights are mounted on seven towers which are spaced at intervals of about 200 feet along the extended runway centerline, about 1,400 feet to the south-southeast. The first of these towers, the one which the aircraft struck, is located about 300 feet from the runway threshold. The alignment indicator lights extend an additional 1,000 feet to the south-southeast and are mounted on five towers spaced about 200 feet apart.

The elevations of the tops of the approach lights and alignment indicator lights vary between 2,272 and 2,246 feet. However, a plane, defined by a line drawn between the lights on the first and last towers and a line drawn through the individual lights on the first tower, slopes upward toward the runway at about 40 minutes of arc, or about $0.67^{\circ}$ to the horizontal. FAA specifications permit an upward slope of 1 percent of the MALSR portion of the system--the system meets these specifications.

The HIRL and MALSR systems are controlled by a single rheostat control switch located in the FSS. The intensity of the HIRL can be varied from low to high. The MALSR has three intensity settings: Low, medium, and high. The low and medium settings were 4 percent and 20 percent, respectively, of the maximum intensity setting. As the intensity of the HIRL is increased from low to high, the MALSR intensity is increased at selected intervals from low to medium to high.

The high-intensity setting of the MALSR was inoperative. When the first officer on Flight 317 asked the FSS specialist to dim the lights, the specialist decreased the intensity of the MALSR from medium to low. The intensity of the HIRL was decreased substantially in the process.

Pilots who were familiar with the MALSR on runway 33 testified that they had experienced a few problems with the lights. Occasionally, the lights seemed too bright. One pilot stated that at night when the cloud bases were low, reflections from the flashing alignment indicator lights created a glare in the cockpit which caused him difficulty. To counteract the glare, he continued to fly by reference to his instruments until the lights were behind him. Another pilot said that when the cloud base or visibility was low, he would have the lights set to maximum brightness until he emerged from the clouds. At that time, he would ask that the lights be dimmed to reduce the blinding effect.

No firefighting or rescue equipment was located at the airport. Police and fire departments from Johnstown and the boroughs nearby provided both men and equipment for firefighting and rescue services.

## 1.11 Flight Recorders

N125AE was not equipped with either a flight data recorder or a cockpit voice recorder, and none was required.

## 1.12 Aircraft Wreckage

The underside of the left wing struck approach lights on a MALSR support tower located 300 ft. from the threshold of runway 33. The aircraft then crashed into a steep embankment about 200 ft. from the threshold. The top of the embankment and the approach lights were at the same elevation as the runway threshold--2,272 ft.

The aircraft struck the embankment, about 7 feet below the top of the embankment, in a noseup and nearly wings-level attitude. The underside of the fuselage struck the embankment first. The area of the fuselage affected extended from a line about 3 feet forward of the leading edges of the wings aft to the rear spars. (See Appendix E.)

The aircraft slid up and over the top of the embankment and came to rest with the empennage hanging over the edge. The nose section of the fuselage separated from the main fuselage section between stations 94 and 107 (just forward of the cockpit windshield) and came to rest, inverted, about 120 feet forwarded of the main section of the fuselage.

The three landing gears were extended, but had broken from their respective supporting structures. The wing flaps were extended to a setting of 64 percent. The horizontal stabilizer trim actuator was set at a 1/2° leading-edge-up position.

There was no evidence of a flight control system failure or malfunction.

The captain's altimeter setting was 29.76 in., and the pointers indicated an altitude of 2,140 feet. The first officer's altimeter setting was 29.80 in., and the pointers indicated an altitude of 600 feet.

The pilot's and copilot's altimeter and vertical speed indicators were recovered and tested. There was no evidence of preimpact damage to, or malfunction of, any of these instruments.

The stall warning transducer and speed control indicator were removed and tested. The stall warning circuit functioned, but it was activating at a higher-than-designed angle of attack. The speed control indicator was inoperative because of a broken resistor wire. It could not be determined if this wire had broken before or at impact.

The No. 1 engine remained attached to the left wing. The No. 2 engine separated from the right wing and was located about 90 feet forward of the main fuselage section. The blades of both propellers sustained severe damage. The power turbine of the No. 2 engine sustained rotational damage. The compressor turbine of the No. 1 engine was rotationally scored uniformly on the rear side of the disk. There was no evidence of internal penetration from rotating components, nor was there fire or heat damage.

The leading edges of the antennae masts on top of the fuselage were covered with ice. The leading edges of both wing tips, outboard of the deicer boots, were covered with ice about 3/4 inch thick. There was no evidence of ice on the pitot tubes, static ports, or any other areas of the aircraft.

## 1.13 Medical and Pathological Information

The 11 fatally injured passengers had head, chest, and internal injuries in addition to fractured extremities and backs. The four passengers who survived had head injuries and fractures of the back and extremities.

The captain died of anoxia induced by chest trauma. Post-mortem examination revealed that the captain had been in good health, anatomically. Toxicological tests showed no evidence of drugs, ethyl alcohol, or carbon monoxide.

The first officer sustained head and leg injuries.

1.14 Fire

There was no fire.

1.15 Survival Aspects

One of the four men who discovered the wreckage said the time was 1915. A person, who was at the passenger terminal waiting for Flight 317 to arrive, said that he saw the Air East agent's car leave the terminal about 1910 to 1915 and that the car returned to the terminal about 1922 to 1927.

Although the FSS specialist logged the time of his call to the police at 1914, the Westmont Police Department dispatcher logged a call from the FSS at 1938. The dispatcher immediately dispatched firefighting equipment and ambulances to the scene. The first emergency vehicles arrived at the scene about 1955. In the meantime, several persons in the passenger terminal went to the scene and began removing passengers from the wreckage.

The underside of the aircraft's fuselage was crushed upward, and the top of the passenger cabin collapsed downward. The cabin walls were extended outward. The floor structure and seat tracks were destroyed. All of the seatbelts were intact but their floor anchorages were destroyed.

Six of the occupants of N125AE were thrown clear of the wreckage through the opening left by the severed nose section. Two survivors, including the first officer, were among these occupants. Because of severe injuries, the remaining survivors were unable to evacuate the aircraft.

1.16 Tests and Research

Motion pictures were taken of the HIRL and MALSR systems on runway 33. The films were made on a clear, dark night from the cockpit of a Grumman-159 at approach speeds of 120 knots. Considering the wind and temperature conditions, the approach ground speed averaged about 122.3 knots, or about 207 feet per second.

Approach slopes of $1^{\circ}$, $2^{\circ}$, and $3^{\circ}$ to the horizontal were flown with the aid of a theodolite to maintain the angles. When the aircraft was 2 miles from the VOR, as measured by the DME, the MALSR were dimmed from the medium-intensity setting to the low-intensity setting,

and the approach was continued to the runway threshold. The film was edited to contain at least one representative approach at each of the three angles.

From that film, it was determined that when the MALSR were dimmed, the HIRL became visible and did not reappear on the film until the aircraft was 13.[illegible] to 15.0 sec. from the end of the runway for a 3° approach slope, 9.1 to 9.25 sec. for a 2° approach slope, and 8.85 to 7.2 sec. for a 1° approach slope. When these times are converted to distances from the runway threshold, the HIRL became visible on the film at a distance of 2,700 to 2,190 feet for a 3° approach slope angle; at 2,300 to 1,915 feet for a 2° approach slope angle; and 1,530 to 1,199 feet for a 1° approach slope angle.

The Beech Aircraft Corporation studied the effects that the accumulation of the ice on N1256E might have had on its performance characteristics. Based on ice samples from the antennae masts, the existing atmospheric conditions, and the Beech P800 icing computer program, the accumulation on areas of the aircraft which were not protected by deicing equipment was estimated.

It was estimated that approximately 53 lbs. of ice had accumulated on N1256E. The effects of the increased weight and disturbance to wing airflow created by the ice combined to increase the calibrated airspeed at which a power-off stall would occur, with landing gear extended and flaps extended to 65 percent, from about 77.7 knots to 82.6 knots (80.2 to 90). 6/ The calibrated airspeed at which a power-on stall would occur was estimated to have increased from about 67 knots to 70 knots (71).

With the aircraft on a 3° descent angle at 115 KIAS, the increase in torque required to compensate for the drag created by the ice was estimated at 12 foot-lbs. per engine, or about 5 percent of the available excess thrust.

The possibility was considered that the captain of Flight 317 might have caused an accelerated stall by pulling up abruptly to avoid a collision with the approach lights and the embankment. Calculations were made to determine the effects on the stall speed that an abrupt

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6/ The airspeed calibration charts for the Beechcraft 99A show that differences exist between calibrated and indicated airspeeds depending on the configuration and engine power settings. The indicated airspeeds taken from these charts are in parentheses.

pull-up of 2g's within 1 sec. would have produced. It was determined that the calibrated, power-off stall speed would have increased to 116.8 knots (127), and the power-on stall speed would have increased to 99 knots (100.4).

The recommended airspeed (1.3 $V_s$) on final approach is about 107 KIAS for a Beechcraft 99A weighing 10,200 lbs. and configured as follows: Landing gear down, flaps extended to 68 percent, and power set to maintain a 500 fpm rate of descent. With the flaps extended to 100 percent, the recommended airspeed is 93 KIAS.

1.17 Other Information

Air East, Inc., was certificated by the FAA as an air taxi/commercial operator under 14 CFR 135 and was registered by the Civil Aeronautics Board (CAB) as an exempted commuter air carrier under 14 CFR 298.

In 1969, Allegheny Airlines filed an application with the CAB requesting that its authority to serve Johnstown, Pennsylvania, 7/ be suspended temporarily and that an agreement between Allegheny and Air East be approved whereby Air East would serve Johnstown. The CAB approved Allegheny's application and the agreement with Air East in an order dated January 6, 1970. The CAB said in the order, "... In essence, the agreement contemplates a situation in which Allegheny will employ an independent contractor to discharge Allegheny's certificate obligations with small aircraft, rather than employing small aircraft in its own operation. The service as a practical matter will be held out and performed through the use of Allegheny's name and facilities...."

The agreement between Air East and Allegheny permitted Air East to use Allegheny's trademarks, including "Allegheny Commuter." Allegheny agreed to provide passenger services at Pittsburgh including the loading, unloading, and handling of passengers, baggage, freight, express, and mail. Allegheny disclaimed responsibility for any other aspects of Air East's operation.

Air East used the trademark "Allegheny Commuter" and the Allegheny logo on its aircraft and some of its facilities. Also, Air East was authorized by the FAA and the CAB to use the name "Allegheny Commuter" under the provisions of 14 CFR 135.13 and 298.23.

7/ Allegheny holds a certificate of convenience and necessity from the CAB to provide air carrier service to Johnstown. Additionally, Allegheny is certificated by the FAA as a domestic air carrier under 14 CFR 121.

Several former Air East pilots testified that the MDA's for the published instrument approaches to Johnstown were not adhered to. They stated that the company vice president for operations cleared individual captains for "company minimums" after he was satisfied that the captain was capable of flying the aircraft to lower MDA's. The "company minimums" involved MDA's of about 200 feet above the airport elevation, and the approaches were flown with the aid of DME. The purpose of the lower MDA's was to achieve a higher completion factor for the flights into Johnstown since the officially reported weather conditions otherwise frequently precluded a successful approach and landing. According to a former Air East pilot, the captain of Flight 317 had been cleared by the company to fly to "company minimums."

The FAA's General Aviation District Office (GADO) at Allegheny County Airport, West Mifflin, Pennsylvania, is responsible for the immediate surveillance of Air East's operation. During the past several years, an average of four operations inspectors, four maintenance inspectors, and one avionics inspector have been assigned to the office.

The Allegheny GADO's district encompasses 28 counties in western Pennsylvania and 4 counties in West Virginia. Within the district, there are about 200 airports, 32 air taxi/commercial operators, numerous general aviation and executive operators, and a substantial number of flight schools. The Allegheny County Airport GADO inspectors are responsible for the surveillance of these activities.

An FAA Systems Worthiness Analysis Program (SWAP) team inspected Air East maintenance facilities in May 1973, and a SWAP operations team inspected Air East's operations facilities in November 1973. No major discrepancies were found during either inspection.

From 1969 to the date of the accident, only one Air East pilot had been cited for violation of Federal Aviation Regulations (FAR's).

In 1972, the Safety Board conducted a special study of air taxi/commercial operators and issued a report. 8/ As a result of the study, the Safety Board made numerous recommendations to the FAA concerning the inadequacy of 14 CFR 135, particularly when applied to commuter air carriers operating under the exemptions and

8/ "Air Taxi Safety Study," Report No. NTSB-AAS-72-9, September 27, 1972.

provisions of Section 298 of the CAB regulations. The thrust of the Safety Board's recommendations was that a distinction should be made between air taxi/commercial operators and commuter air carriers, and the distinction should be provided for in the FAR's by applying more stringent safety rules to, and increase surveillance of, the commuter carriers. The FAA has not yet revised Section 135 to reflect this distinction.

## 2. ANALYSIS AND CONCLUSIONS

### 2.1 Analysis

#### Causal Aspects

The aircraft was certificated, equipped, and maintained according to regulations and approved procedures. There was no evidence of a preimpact failure or malfunction of the aircraft's structure, powerplants, or control systems. The DME and encoding transponder were inoperative, but neither was required nor necessary for the flight to Johnstown. The broken resistor wire in the speed control system would have made the stall warning vane heater and the speed control indicator inoperative. However, it would not affect the stall warning circuit for the horn as long as the vane was not affected by ice. If the resistor wire was broken before the accident, the pilot would have known that a problem existed because the speed control indicator would have been inoperative. The fact that the stall warning transducer was actuating on the slow side during the bench testing is not conclusive since the transducer is adjusted, through flight tests, to the aircraft on which it is installed.

The aircraft was within gross weight limitations, but it was loaded in such a manner that the aft c.g. limit was exceeded slightly. Other than decreasing the noseup pitch control forces slightly, it is doubtful that the aft c.g. condition significantly affected the aircraft's performance.

The flightcrew had received the training and off-duty time required by regulation. There was no evidence that the flightcrew was not capable of performing the duties assigned, nor was there any evidence of medical or physiological problems that might have affected their performance.

The captain was properly certificated but was not qualified during the first 2 months of his employment with Air East. However, because he passed the check given by the FAA check pilot on

September 9, 1973, he met the requirements of 14 CFR 135.131 and 135.138, and he was qualified for duty at the time of the accident.

The first officer was properly certificated but, technically, was not qualified because he had not been given a valid check on July 9, 1973. However, considering the first officer's experience and the later unofficial check given by the company check pilot, there is no reason to believe that the first officer was not capable of performing his duties.

Since the aircraft crashed a considerable distance short of the runway threshold, either the captain misjudged his altitude during the final stages of the approach or the aircraft was affected by a strong downdraft, or a combination of these two events occurred.

Because winds in the earth's friction layer tend to follow the terrain, downdrafts frequently develop on the lee side of high terrain. The terrain near the approach end of runway 33 descends steeply from the lip of the airport embankment. Several pilots, who were familiar with the approach to runway 33, confirmed the existence of downdrafts there, but they stated that the downdrafts caused a problem only when the surface winds were high -- well in excess of 15 knots. The surface winds at the time of the accident were about 12 to 14 knots. Therefore, it is probable that some light downdrafts existed near the approach end of runway 33. However, it is unlikely that the downdrafts would have been severe enough to have caused a significant loss of altitude -- certainly not 40 feet, the approximate altitude at which the aircraft should have been above the approach lights which it struck.

Based on the condition of the powerplants, performance calculations, and the first officer's testimony, the descent preceding impact could not have resulted from a lack of available thrust. Therefore, the most likely reason for the descent was the captain's misjudgment of his height above the approach lights.

If, after recognition of his abnormally low altitude, the captain rotated the aircraft rapidly in an attempt to arrest the descent and reach the runway, he could have induced an accelerated stall at a relatively high airspeed. The first officer's recollections, the high noseup attitude in which the aircraft struck the embankment, and the fact that the aircraft lost altitude between the approach lights which it struck and the embankment, support the conclusion that the aircraft stalled abruptly just before impact. Additionally, the accelerated stall calculations indicate that at an approach speed of 115 to 120 knots with a normal power setting, an accelerated stall could have been

induced easily. If the captain had been making the approach at lower than prescribed airspeeds -- a possibility suggested by the first officer -- a stall could have been induced with moderate control inputs.

The Safety Board believes that a combination of two factors most probably was responsible for the captain's misjudgment of his altitude above the approach lights during the final stages of the approach. These two factors were: (1) The manner in which the approach was conducted, and (2) the visual effects produced by the runway/approach lighting system.

Although the first factor involves inferences that cannot be conclusively supported by the available evidence because the first officer recalls little more than that the approach was normal until just before impact, the Safety Board believes that the circumstantial evidence is strong enough to substantiate this factor as more than a hypothesis.

The captain had received the weather information before he began the approach, and, therefore, he knew that he might have to descend to as low as 200 feet above the airport elevation, or as much as 460 feet below the MDA, to acquire the visual reference he would need to make the landing. He had been cleared by the company to fly to "company minimums," and, consequently, given the reported weather conditions, company officials would expect him to land at Johnstown.

The captain could begin the approach without fear of violating any regulations, because the reported visibility was well in excess of the required minimum of 1/2 mile. To conform to the FAR's, though, he could not descend below 2,940 feet, or about 360 feet above the reported base of the ceiling, until he had the approach threshold, the approach lights, or other markings identifiable with the approach end of runway 33 in sight. Therefore, the question arises of how a landing could be made with a reported ceiling of 300 feet when the MDA was about 360 feet above the base of the ceiling.

Based on the first officer's statements, the answer is that the ceiling and visibility were higher between the compass locator and the airport than they were at the airport -- the point of measurement. However, the Safety Board believes that the weight of the evidence is to the contrary.

The compass locator is on a ridge which is 400 to 600 feet higher than the airport. Consequently, there would have been an

upslope flow of moist air which would most likely have produced lower rather than higher ceilings and visibilities between the compass locator and the airport.

Also, it is significant that about 3 minutes passed between the time the first officer reported that the approach lights were in sight and the time he requested that the lights be dimmed. During that 3 minutes, the aircraft would have flown about 5 miles. Consequently, if the first officer had requested that the lights be dimmed when the aircraft was about 3/4 mile from the threshold, as he said he did, the aircraft must have been close to the compass locator when he reported that the lights were in sight. Therefore, if the captain had adhered to the published crossing altitude at the compass locator and had descended at a normal rate, which according to the first officer he did, the aircraft would have been about 5.75 miles from the threshold and about 1,800 feet above the airport elevation when the "lights in sight" call was made rather than 3 to 4 miles and 600 to 700 feet, respectively, as stated by the first officer.

Further, if the captain, after passing the compass locator at the published crossing altitude, had maintained a 400 fpm rate of descent and an indicated airspeed of approximately 120 knots as stated by the first officer, the aircraft would have been at an altitude of about 800 feet above the runway when over the threshold.

Therefore, because of the inconsistencies related to the first officer's recollections, the Safety Board finds them unpersuasive and believes that weather conditions similar to those at the airport most likely existed between the compass locator and the airport.

Without the aid of DME, and before descending below the overcast, the distance to the runway would have to be determined either from time and groundspeed calculations or by passage of the MM. It is unlikely that the captain would have delayed his descent from published MDA to "company minimums" until he received indications of MM passage, because of the high rate of descent that would be required to continue the approach to a landing. Therefore, it is more probable that he would have continued his descent to "company minimums" after he was certain that he was past the hilltop obstruction that rises to an elevation of 2,640 feet. Under those circumstances, his approach slope angle to the runway, after descending below the overcast, would have been a function of his time and groundspeed from the compass locator. Therefore, depending on the accuracy of his calculation, the angle could have been excessively steep or shallow, or it could have been normal, that is, the angle associated with an altitude of about 300 feet above the threshold when at a range of about 1 mile from the threshold.

Because about 5 minutes elapsed from the time the first officer reported that the flight was inbound from the compass locator until the time he requested that the approach lights be dimmed, the aircraft must have been very close to, or over, the approach end of the MALSR when he made the request. Therefore, it appears very likely that the aircraft emerged from a low overcast (200 to 400 feet) in proximity to the approach lights. Under those conditions, the captain would have had to descend at a relatively steep angle to land on the runway reasonably close to the threshold. His rate of descent, therefore, would have been high, and he would have had little time to accommodate to the brightness of the lights. Additionally, his vision could have been impaired by reflections of the flashing alignment indicator lights from the bases of the low clouds above. Those factors could have caused the captain to miscalculate his rate of descent and misjudge his altitude above the lights. If, after recognition of his dangerously low altitude, he attempted to make rapid corrections he could have induced an accelerated stall and lost control of the aircraft at an altitude from which recovery was impossible. Under those circumstances, it is doubtful that an operative stall warning horn would have provided a timely warning.

If the approach angle had been normal or shallow, after descending below the overcast, visual illusions associated with the runway/approach lighting system could have caused the captain to misjudge his height above the runway threshold. However, since the exact manner and conditions in which the descent below the overcast was executed are not known, it is not possible to assess accurately the role of visual illusions in this accident. Nevertheless, it is reasonable to assume that, if the HIRL/MALSR were dimmed when the aircraft was farther than about 1/2 mile from the runway threshold, the transient invisibility of the HIRL combined with the upward slope of the MALSR could have created a visual illusion with regard to the aircraft's height above the runway threshold. This is because a pilot will tend to fly a shallower approach slope angle toward an approach light system that slopes upward to the runway, particularly when the runway lights are not visible. Consequently, if this illusion was not replaced with a proper perception of the aircraft-to-runway relationship until the aircraft was too close in and too low, the captain may have rotated the aircraft too rapidly in an effort to place it on the proper approach path, and thereby precipitated an accelerated stall and loss of control at too low an altitude.

## Survival Aspects

The accident was essentially nonsurvivable. The decelerative forces were high, although primarily vertical, because the aircraft struck the embankment in a high noseup attitude. The structural integrity of the floors, walls, and ceiling of the passenger cabin was severely compromised, and the occupiable space was reduced substantially. Additionally, although all the seatbelts remained buckled, their floor anchorages and seat tracks failed, which allowed the seats and their occupants to collide with objects around them.

The two survivors who were ejected from the aircraft were severely injured, but they escaped severe collisions with other objects and were not fatally injured. The other survivors remained in the passenger cabin, but they also escaped fatal impact with other objects. However, if there had been a postcrash fire, these three survivors probably would have perished because they were too seriously injured to escape and assistance was not readily available.

The FSS specialist must have entered an erroneous time on his log regarding his telephone call to rescue authorities. Since there were many confusing aspects about the whereabouts of Flight 317, an erroneous entry could have been made easily. Moreover, it is unlikely that an erroneous entry would have been detected later by a reconstruction of events from memory.

The location of Flight 317 remained undetected for a substantial period of time, and about 33 minutes elapsed from the time of the crash until rescue authorities were notified. Because of poor road conditions, another 17 minutes or more elapsed before the rescue equipment arrived at the scene. Based on the nature and severity of the injuries, however, it is doubtful that the delay aggravated the injuries or contributed to the number of deaths. Nevertheless, the rescue problems involved in this accident emphasize the importance of having crash/rescue equipment and personnel available at airports served by air carriers.

## Regulatory and Surveillance Aspects

The manner in which Air East conducted various aspects of its operations and the FAA's failure to detect the violations and deficiencies suggest the continued need for more stringent surveillance of commuter air carriers. Also, improvements are needed in the FAR's which regulate the activities of these carriers. Consequently, the recommendations made by the Safety Board in its 1972 study of air taxi/commercial

operators should be implemented. We believe that the FAA should expedite the revision of 14 CFR 135 in accordance with those recommendations.

## 2.2 Conclusions

(a) Findings

1. The pilots were properly certificated, and the captain was qualified to perform his duties. The first officer had not been properly qualified, but the evidence indicated that he was capable of performing copilot duties.

2. The aircraft stalled just before impact and struck the embankment in a high noseup attitude.

3. The aircraft had accumulated significant amounts of ice on areas not protected by deicing equipment; the ice had little adverse effect on the aircraft's performance.

4. By applying 2g's within 1 sec. in a wings-level pullup, the power-off stall speed for N125AE would have increased from about 90 to 127 KIAS and the power-on stall speed would have increased from about 71 to 100.4 KIAS.

5. The aircraft was improperly loaded and the load manifest did not accurately reflect the aircraft's weight or c.g. condition.

6. The aircraft's c.g. was 1.12 in. aft of the maximum limit at the time of the accident; however, this c.g. condition did not significantly affect the aircraft's performance.

7. Weather conditions similar to those reported at the Johnstown airport just before and after the accident probably existed between the compass locator and the airport at the time of the accident.

8. Light downdrafts probably existed in the approach area to runway 33.

9. The captain probably descended well below the published MDA before he established clear visual reference with the approach threshold of runway 33, the approach lights, or other markings identifiable with the approach end of runway 33.

10. When the MALSR was dimmed from medium intensity to low intensity, the intensity of the HIRL was reduced substantially.

11. The reduced intensity of the HIRL made it invisible to a pilot at ranges that varied with his approach slope angle to runway 33.

12. The HIRL and MALSR systems met FAA specifications.

13. At ranges in excess of 3,000 feet, the dimmed HIRL probably was invisible to a pilot flying a $3^{\circ}$ or less, approach slope angle to runway 33.

14. The plane of the MALSR sloped upward at an angle of $0.67^{\circ}$ to the threshold of runway 33.

15. Until the dimmed HIRL became visible, the MALSR system provided the only meaningful lights by which a pilot could judge his approach angle to runway 33.

16. Air East captains regularly conducted instrument approaches to lower MDA's than those approved by the FAA.

17. Prior to the accident the FAA did not detect the improper practices and violations that Air East personnel were systematically involved in.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was a premature descent below a safe approach slope followed by a stall and loss of aircraft control. The reason for the premature descent could not be determined, but it was probably the result of: (1) A deliberate descent below the published minimum descent altitude to establish reference with the approach lights and make the landing, (2) a visual impairment or optical illusion created by the runway/approach lighting systems, and (3) downdrafts near the approach end of the runway.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

January 15, 1975

# APPENDIX A

## INVESTIGATION AND HEARING

### 1. Investigation

The National Transportation Safety Board was notified of the accident about 1955 on January 6, 1974. The Safety Board immediately dispatched an investigator to the scene. On January 7, 1974, a team was dispatched. The team established investigative groups for operations, air traffic control, witnesses, human factors, structures and systems, and powerplants.

Parties to the investigation were: The Federal Aviation Administration; Air East, Inc.; Allegheny Airlines, Inc.; the Beechcraft Aircraft Corporation; and the Bureau of Aviation, Pennsylvania Department of Transportation.

### 2. Hearing

No public hearing was held. The depositions of 12 witnesses were taken in Johnstown, Pennsylvania, on May 23 and 24, 1974.

## APPENDIX B

## CREW INFORMATION

### Captain Daniel W. Brannon

Captain Brannon, 39, was employed by Air East, Inc., on July 9, 1973. He held Airline Transport Pilot certificate No. 1311410, with airplane multiengine and single-engine land ratings, commercial privileges, and type ratings in DC-3 and L-T33 (VFR only) aircraft. He passed a first-class medical examination with no limitations on May 5, 1973. Because 6 months had elapsed since that examination, he held a valid second-class medical certificate.

Captain Brannon had accumulated 6,331.6 flight-hours. He had 383.4 hours in the Beechcraft 99A, including 201.9 hours as pilot-in-command. In the 30-, 60-, and 90-day periods preceding the accident, he flew 59.3, 129.5, and 194.7 hours, respectively.

### First Officer Gerald W. Knouff

First Officer Knouff, 24, was employed by Air East on July 3, 1973. He holds an Airline Transport Pilot certificate, airplane multiengine land and single-engine land and sea ratings, and commercial privileges.

First Officer Knouff had accumulated 1,790.9 flight-hours, including 380.5 hours as second-in-command on the Beechcraft 99A. In the 30-, 60-, and 90-day periods preceding the accident, he flew 59.4, 124.4, and 201.1 hours, respectively.

## APPENDIX C

## AIRCRAFT INFORMATION

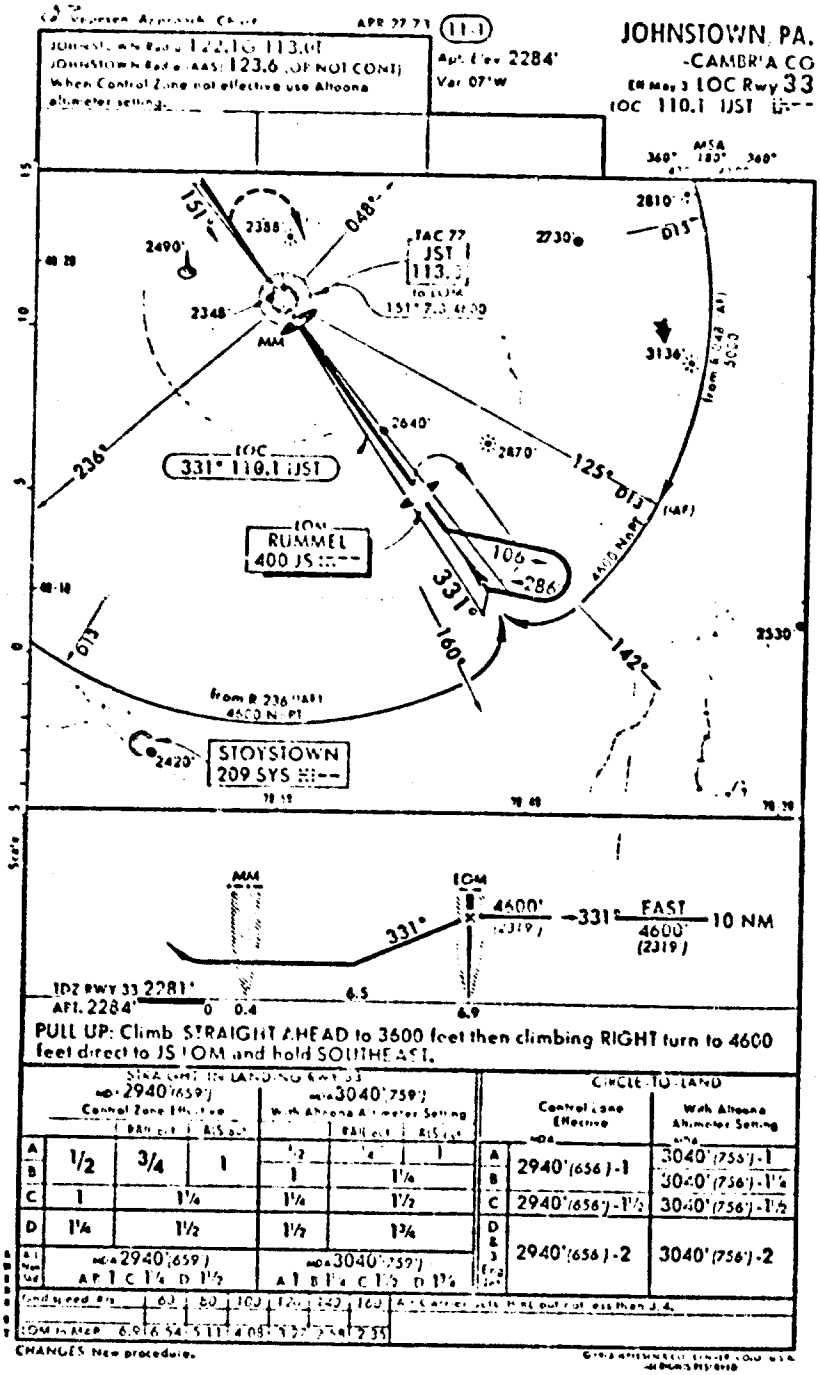
N125AE was powered by two Pratt and Whitney Aircraft PT6A-27 free-turbine engines. Each engine was equipped with a Hartzell Model HCB3TN-3 propeller. All airworthiness directives on the aircraft, engines, and propellers had been complied with, and components with limited life restrictions were within the prescribed limits.

Engine and propeller data are as follows:

| Engine Position | Serial No. | Time Since Overhaul | Cycles | Total Time |
|---|---|---|---|---|
| 1 | PC-E40088 | 2,594.9 | 15,036 | 6,974.8 |
| 2 | PC-E40069 | 3,156.2 | 15,558 | 7,216.6 |

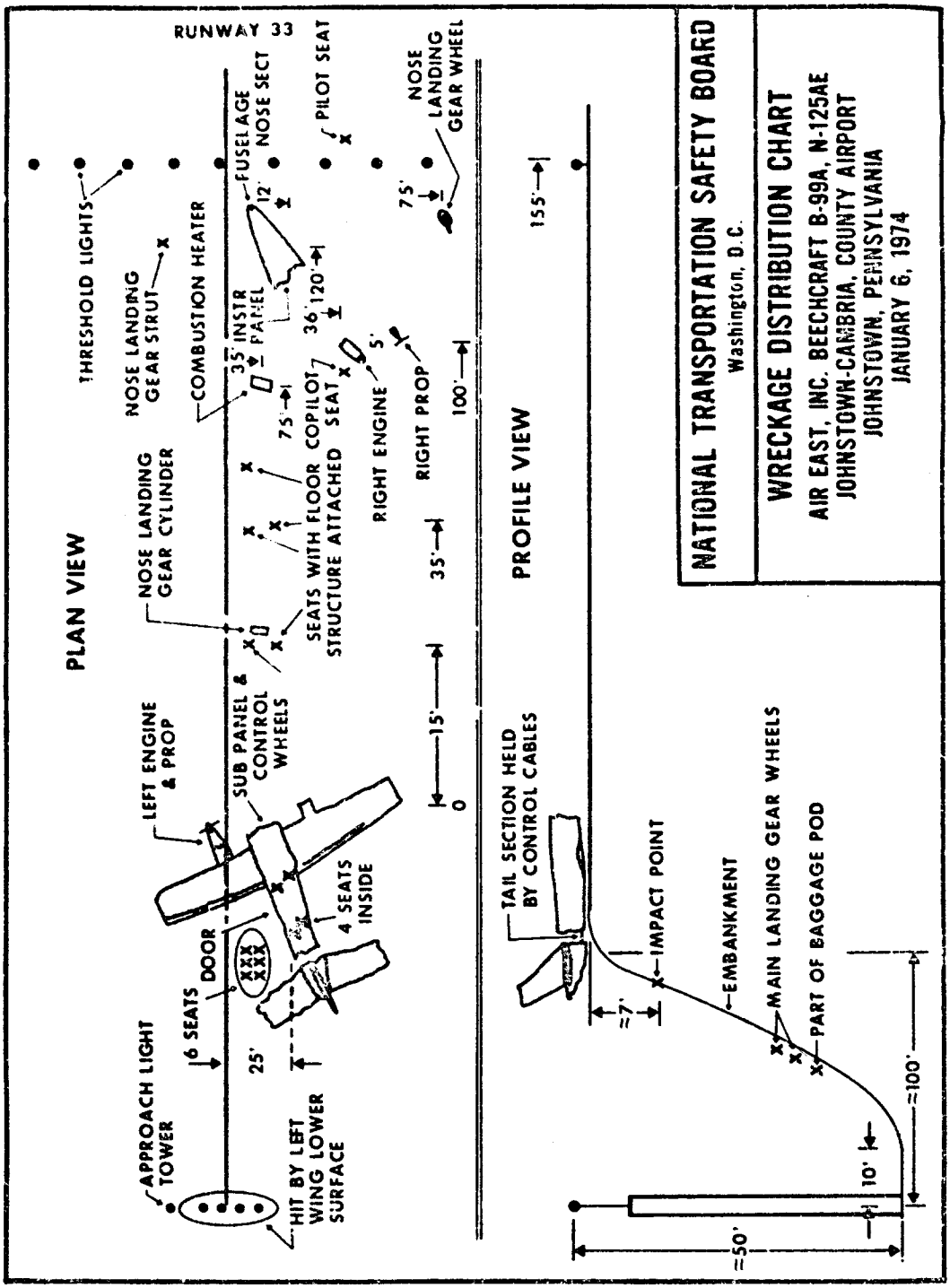
| Propeller Position | Hub Serial No. | Hub & Blade Time Since Overhaul |
|---|---|---|
| 1 | BU1661 | 242.6 |
| 2 | BU1804 | 2,579.4 |

APPENDIX D




"ILLUSTRATION ONLY - NOT TO BE USED FOR NAVIGATIONAL PURPOSES"

APPENDIX E

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