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CIVIL AERONAUTICS BOARD

JUN 21 1 32 PM '57 AMENDED ACCIDENT INVESTIGATION REPORT

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SAFETY DIVISION

Adopted: June 3, 1957

Released: June 6, 1957

EASTERN AIR LINES, INC., LOCKHEED L-749A, CONSTELLATION  
N 112A, JACKSONVILLE, FLORIDA, DECEMBER 21, 1955

The Accident

At 0343, <sup>1/</sup> December 21, 1955, a Lockheed Constellation, model L-749A, N 112A, owned by Eastern Air Lines, Inc., and operated as Flight 642, crashed during an ILS (Instrument Landing System) approach to runway 5, Imeson Airport, Jacksonville, Florida. The aircraft was destroyed by impact and fire and all 17 occupants, including the crew of five, were killed.

History of the Flight

Flight 642 originated at Miami, Florida, with its destination Boston, Massachusetts; Jacksonville, Florida, was included as an intermediate stop. The captain was briefed by the company forecaster on the en route weather and terminal forecasts, and following the briefing the flight was dispatched to Jacksonville on an IFR (Instrument Flight Rules) flight plan. This plan specified a flight to be made via Victor Airway 3 at a cruising altitude of 11,000 feet. The crew consisted of Captain Thomas Francis McBrien, Pilot John Jay Rinyu, Flight Engineer Charles Calvin Devine, and Flight Attendants Emma Elizabeth Williams and Clara Dorothea Roseco. There were 12 passengers on board.

Flight 642 was scheduled to depart Miami International Airport at 2340, December 20, but because of the late arrival of an inbound flight using the aircraft involved departure was not made until 0212, December 21. According to company records, the gross weight of the aircraft at the time of departure was 85,944 pounds, which was under the allowable takeoff gross weight of 107,000 pounds; the load was properly distributed.

Routine en route radio reports were made and at 0315 the flight reported over Daytona Beach at 11,000 feet, estimating Jacksonville at 0336. This report was made to the company's Jacksonville station and at this time the flight was given the Jacksonville 0248 U. S. Weather Bureau special report: "Thin obscuration, 2 miles visibility; ground fog; wind north-northwest 6 miles per hour; 30 percent of sky obscured." After this message was acknowledged, the flight was given the following clearance: "Jacksonville air route traffic control clears Eastern Air Lines Flight 642 to Jacksonville middle marker IIS,

<sup>1/</sup> All times herein are eastern standard and are based on the 24-hour clock, altitudes are mean sea level.

cross middle marker ILS at 2,500 feet, maintain 2,500 feet until further advised. Contact Jacksonville approach control when over Sunbeam Intersection." The clearance was acknowledged.

Flight 642 contacted Jacksonville approach control when over Sunbeam Intersection (16 miles SSE of Imeson Airport) at 0331, and was cleared for an ILS approach to runway 5. At the same time the Jacksonville weather was given as: "Partial obscurement; visibility one-half mile; altimeter 30.18." Immediately following this transmittal another message was given the flight, "Coming out with indefinite 300 obscurement now one-half with fog." (Eastern Air Lines' Constellation minimums for ILS approaches at Jacksonville, day or night, are ceiling 200 feet, visibility one-half mile.)

After acknowledging this weather information, Flight 642 reported leaving Sunbeam at 2,500 feet. Following a later query from the flight, approach control advised that there was no other known traffic in the area, and requested the flight to report when over the outer marker inbound. Flight 642 reported over the outer marker inbound and was cleared to land.

Shortly thereafter the tower controller observed a large flash in the vicinity of the ILS middle marker. Calls to Flight 642 were not acknowledged and an emergency was declared by the controller. It was subsequently learned that N 112A had crashed approximately six-tenths of a mile southwest of the threshold of runway 5.

### Investigation

Investigation disclosed the main portion of the wreckage to be 212 feet northwest of the ILS middle marker and 3,486 feet southwest of the threshold of runway 5. The time of the accident was established as 0343.

First impact of the aircraft was with the top of a small pine tree approximately 200 feet below the ILS glide path, 260 feet to the left of the extended centerline of the runway, 4,000 feet from the threshold of runway 5, and 420 feet southwest of the middle marker. This was followed by striking a 50-foot oak tree, the upper 20 feet of which was sheared off. The aircraft settled toward the ground, striking other large trees which disintegrated both wings and a portion of the empennage. Ground contact was on a heading approximately 55 degrees magnetic. The distance from the first tree struck to the farthest piece of wreckage was 801 feet. Explosion and fire occurred immediately upon impact.

The cabin and cockpit areas were completely consumed in the ground fire with the exception of the lower fuselage skin and portions of the cabin flooring. The fuselage aft of the rear pressure bulkhead and the center rudder fin and portions of the stabilizer were intact, but with surface scorching indications. The tail cone was found in a relatively undamaged condition with the control booster mechanisms in proper position.

Outer portions of the left and right wings had been separated from the main structure during the passage through the trees and along the ground. The

"speedpack"<sup>2/</sup> was torn from the bottom of the fuselage at ground impact. Wing flaps were determined to have been in the 60-percent extension position, and their positions were symmetrical at the time of impact.

Control systems were examined and no evidence was found to indicate failure prior to impact.

Separation of the right main gear and part of the nose gear had occurred at ground contact. The left main gear was intact and in the extended and locked position; the cockpit landing gear lever was found in the "down" position. Measurement of the right main gear actuating cylinder piston rod revealed the same 15 inches as found on the down and locked left main gear actuating cylinder piston rod.

Cockpit instruments were largely destroyed by fire; readings obtainable gave evidence of routine operation. Radio equipment reflected settings for a normal ILS approach with appropriate frequencies for Jacksonville approach control and Jacksonville ILS, including glide slope and the ILS middle and outer markers.

All boost control assemblies were found in the "boost on" position. A bench check revealed that all boost actuating cylinders had normal travel in both directions and showed no signs of abnormal internal leakage. Relief valves and bypass controls operated normally. The filters showed a normal differential pressure between inlet and outlet. The elevator boost was installed in a similar aircraft and flight tested. It functioned in a normal manner.

On impact the four powerplants separated at their attach points and came to rest a few feet ahead of the main wreckage. Number 4 engine suffered extensive damage in the ground fire. Examination of the interiors of all four crankcases gave no indication of rotational or reciprocating interferences or operating irregularity of any kind. All oil pumps were free of metal particles and revealed no scoring. There was no evidence to indicate that the engines were not capable of developing power prior to impact.

All propeller blades were broken or bent, with bending generally rearward, and five of them were broken at the butt ends. The dome position and blade angles were found to be in settings that indicated normal operation of all engines.

Computations made by using the distance between the slash marks of the blades of one propeller, and the determined revolutions per minute setting of its governor, indicate a speed of approximately 140 knots at impact.

The tearing free of all powerplants resulted in the pulling and breaking of control cables under tension. Several of the cable-controlled fuel shutoff valves were found in the closed position; the electrically controlled firewall fuel shutoff valves were all open.

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<sup>2/</sup> A large detachable cargo compartment positioned on the underside of the fuselage.

From markings presented by ground object contacts of the airframe and propellers it was determined that just prior to impact the airplane was in a slight turn to the right and banked approximately 11-1/2 degrees. The longitudinal attitude of the airplane was approximately 4-3/4 degrees nose-up and the angle of descent during the last 200 feet of the flight path was about 2-1/2 degrees, with the rate of descent being 10 feet per second.

Several flight checks of ground navigational facilities soon after the accident showed operation of the systems to be normal. Simulated ILS approaches were made, with a Board investigator as observer, to determine the effect on cockpit instruments caused by vehicles parked on the highway below the glide path. The highway is about 100 feet east of the middle marker. On one approach, with a crane-equipped truck parked beneath the glide path, a flydown indication was noted prior to reaching the middle marker. It was necessary to descend 60 feet in order to center the needle. However, the glide path indication was found to be normal at the middle marker, where the accident occurred.

Several persons saw or heard the aircraft, with normal engine sound. A power surge was heard just before impact. One witness, who was near the middle marker, said he first saw the landing lights, lighted and pointing straight down, and that they partially extended before he lost sight of the aircraft. Other witnesses near the accident scene did not see the landing lights on. Subsequent investigation disclosed that the right landing light had been destroyed but the left light was found in the retracted position. There was no fire observed by any witness prior to impact. One witness saw the aircraft, at a very low altitude, make a slight turn to the right just before it contacted the trees and ground.<sup>3/</sup>

A witness who was driving a trailer-truck south along the highway adjacent to the airport said he saw what he believed to be two jet-propelled aircraft pass from right to left in front of him, flying at an altitude of 150-250 feet. He stated that at the same time he observed these aircraft he saw a bright flash, whereupon he immediately stopped his truck and walked down the highway. To his right he saw scattered parts of an aircraft burning. He also said that before reaching the airport he had passed through patches of ground fog, that at the airport there was an overcast condition, and that he again passed through patches of ground fog as he continued south.

The two airport tower controllers in radio contact with the flight stated they heard it pass over the south edge of the field, proceeding outbound. At this time the runway lights were on at their highest intensity. One of the two controllers on duty stated that he went downstairs to the radar room and, on the ASR (Airport Surveillance Radar) scope, observed the flight just before it reached the outer marker outbound. He also said he saw the start and completion of a procedure turn and observed the aircraft start inbound, after which he gave the flight its three-, two-, and one-mile range positions. The tower recording of outgoing messages does not include the three-mile position message. The ASR equipment at Jacksonville does not show altitude above the ground. The controller stated that forward movement ceased soon after the image of the aircraft on the scope passed the one-mile position from the end of the runway.

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<sup>3/</sup> See attachment A.

This radar observation coincides with the geographical position of the crash. During the entire time the controller was watching the scope, set to 10-mile range, he saw no other aircraft. Comprehensive investigation revealed no other traffic, either civil or military, in the area during the approach of the subject aircraft.

Several months after the public hearing the Air Line Pilots Association gave the Board names of persons it believed could present additional evidence that might establish the presence of jet aircraft near the scene of the accident at the time it occurred. Accordingly, the Board took depositions of those witnesses in Florida. In addition, a deposition was taken of the truck driver who had said he saw jet aircraft flying in the vicinity at the time of the crash. (This truck driver had previously given a CAB investigator a clear and concise statement which had been carefully evaluated.)

One of the witnesses suggested was an airline captain who stated that about a month after the accident, while flying near the outer marker at Jacksonville, he observed several jet aircraft beneath him through a hole in the clouds. He said that tower personnel had no knowledge of these aircraft and therefore could not advise his flight to be on the alert for them. Tower personnel on duty at the time were questioned but did not remember the occurrence. None of the witnesses questioned presented any pertinent evidence that had not been previously evaluated.

As jet aircraft were reported being seen by witnesses but were not seen by experienced radar scanners, it was decided that test flights were necessary to determine if jet aircraft flying at low altitudes could be seen on the radar scope. With the cooperation of the Florida Air National Guard, such flights were made. A jet aircraft was flown at altitudes ranging from 150 to 600 feet above the ground at an airspeed of 350 m. p. h. These flights, made both near the scene of the accident and the outer marker, were all observed on the radar scope by a CAB investigator, as well as by CAA personnel. Throughout the tests the aircraft was never lost from sight for more than one sweep of the scope.

Captain McBrien and Pilot Rinyu were familiar with Imeson Airport. Company records disclosed that Captain McBrien had made 17 landings at Jacksonville during 1955, five being in the month of December. The records also indicate that Pilot Rinyu had recently made landings at this airport.

The night of December 20-21 weather stations from Miami to Savannah, Georgia, were reporting a small spread between temperature and dewpoint. The company terminal forecast for Jacksonville was ceiling and visibility unlimited; this was not amended until 0345 when it was changed to ceiling 300 feet, broken clouds; visibility three-fourths of a mile; fog. During the briefing the company forecaster advised the crew that patchy ground fog could be expected in the Jacksonville area.

Shortly after the flight reached the Jacksonville area the weather was being reported as ceiling indefinite 300 feet, sky obscured; visibility one-half mile; and fog. This observation was given to the flight before the IIS approach began.

Exact visibility conditions at the crash scene are not known but all indications are that they were similar to those reported at the airport.

About 15 minutes before the accident occurred an aircraft of another airline was making an instrument training flight in the vicinity of Jacksonville. As a part of this training the flight completed an ILS approach to Imeson Airport and landed there at 0328. Reporting on the weather conditions at that time and the operation of the navigational facilities, the captain stated that the tops of the clouds were approximately 450 feet with their base at 300-250 feet, and that all facilities operated in a normal manner. He also said the airport appeared to be covered by a broken to overcast stratus cloud condition which seemed to him to be caused, in part, by smoke from adjacent mills. He said he entered this obscurement near the middle marker and that the weather elsewhere was spotty to clear.

An Eastern Air Lines airplane flying south at an altitude of 22,000 feet was over the airport at the time of the accident. The captain of this flight said he saw a brilliant flash and saw the flames of the burning aircraft. He described the clouds below him as wavy in form with vertical visibility very good looking through the troughs and reduced somewhat when looking through the crests. He further said he could easily see the approach lights, lights of the airport, and lights of neon signs along the adjacent highway.

#### Analysis

It is evident that all components of the ILS system (outer marker, middle marker, glide path, localizer, approach lights, threshold and high intensity runway lights) were operating normally at the time of the accident. This was also indicated by another flight which made an ILS approach and landing approximately 15 minutes before the accident. At that time the system was normal, as it was on two approaches made several hours after the accident. Monitoring records of the system gave no indication of any deviation from normal operation during the early morning of December 21. All contacts with Flight 642 by Jacksonville approach control were routine and the crew did not report any operating difficulties. The flight had been given all necessary altimeter and weather information.

The testimony of witnesses who observed the landing lights of the aircraft come on during the approach, and other witnesses who saw no landing lights, is not completely incompatible. Since the lights were found in the retracted position it is indicated that once lowered they might have been retracted to eliminate reflection as the aircraft descended into the layer of fog. The significance of the testimony concerning a power surge immediately before or at the time of initial contact with the trees cannot be fully established. The majority of the witnesses reported no surge of power, and it is possible that increase of power was apparent only as a result of the relative motion of the aircraft with respect to the witness and the rapidly changing conditions of reflection or shielding of sound at the low altitude at which the aircraft was being flown. The investigation of the wreckage clearly establishes that climb power which would be expected to be applied in a missed-approach procedure was not, in fact, being used at the time of impact with the ground. Furthermore, none of the other essential elements of a missed-approach procedure had been accomplished prior to the accident.

Every possible effort was made to account for the jet-propelled aircraft being in the area when the accident occurred. All military services were contacted and each said they had no jet aircraft flying in that area at the time of the accident. Neither the tower personnel, witnesses on the airport, nor witnesses other than the truck driver near the accident scene saw any jet aircraft and such aircraft were not observed on the radar scope. In view of the truck driver's testimony, the Florida Air National Guard, under the direction of a CAB investigator, made several flights (using a jet aircraft) in an effort to simulate the conditions described by the truck driver. Each of these flights was plainly visible on the radar scope. It therefore is concluded that no such aircraft were in the vicinity.

The crew filed an IFR flight plan prior to leaving Miami and gave as the alternate Orlando, Florida. The flight to Jacksonville was made in clear weather and clouds or obscuration were not encountered until in the vicinity of Jacksonville. From the testimony of other pilots flying in the vicinity a short time prior to the accident, there was a layer of cloud, which included smoke and fog, capping the airport with a general foggy condition existing a few miles to the southwest. All other areas appeared to be clear. It therefore appears likely that Flight 642 was clear of clouds from Sunbeam Intersection to the middle marker and outbound to the outer marker, and that it probably did not encounter obscurement until in the vicinity of the middle marker inbound. Although this weather condition has been described as partial obscurement with horizontal visibility of one-half mile, it is apparent from the testimony of pilots that vertical visibility throughout the area was generally good. Some of the witnesses said the ground visibility at and near the accident was poor. There is no way of determining ceiling height or visibility distance at the accident site. However, the weather information reported to the crew was obtained at the control tower. The tower is located approximately one mile north-northeast of the accident scene. At the time of the accident a wind of six knots was blowing from the north-northwest, and it is believed that between the time of the last reporting and the accident the weather conditions at the observation point could have moved to the general area of the accident and therefore should have been essentially the same as that reported to the crew, "Indefinite 300, sky obscured; visibility 1/2 mile and fog."

Assuming that weather conditions were similar at the crash point and the observation point, consideration should be given to the decrease of horizontal visibility with elevation. Horizontal visibility must have been near zero at 300 feet above the ground. Normally, slant visibility down the glide path should have gradually increased as the aircraft descended.

As previously mentioned, the radar scope at Jacksonville does not reflect altitude. However, since the radar operator testified that the aircraft was observed to fly beyond the outer marker, make a procedure turn, and return inbound, it is believed that this was accomplished at the normal altitude of 1,200 feet. The propeller slash marks at the scene indicated the speed of the aircraft at impact to be 140 knots. The company's instructions for this type aircraft show a recommended approach speed of 115 knots from the outer marker to the minimum authorized altitude.

Evidence indicates that the aircraft was flying in a normal manner just prior to impact and there is no known evidence to indicate any malfunctioning of the aircraft or any of its components. The flaps were extended to a position used for maneuvering and this amount of flap extension is usually used in this type of approach until reaching the middle marker. Although the aircraft was 200 feet to the left of course this is a small deviation at that point in the approach and only a slight correction would have been required to again align with the runway. The fact that the airplane was in a slight right turn and almost level horizontally at impact would suggest that the pilot was turning toward the localizer course, further indicating the aircraft was under control.

It is not unusual, with weather conditions such as existed this day, for pilots during an approach to an airport to find ceilings and visibilities that vary from those reported. These variations may be either on the low or high side. If, on the morning of the accident, Captain McBrien found the visibility to be lower than one-half mile, it would then have been his responsibility to execute a missed-approach procedure.

### Findings

On the basis of all available evidence the Board finds that:

1. The aircraft, the carrier, and the crew with one exception were currently certificated.
2. The aircraft's gross weight at takeoff was under the maximum allowable gross takeoff weight, and the load was properly distributed.
3. The flight was routine to Jacksonville and the start of the final approach.
4. No evidence of failure of the airframe, powerplants, controls, or other components was found.
5. The weather at the airport was marginal with local fog and restricted visibility; however, at last report the weather was above the carrier's minimums.
6. Ground navigational facilities in the Jacksonville area, including the ILS system, functioned normally during the approach.
7. There was no operating difficulty reported by the crew.
8. There were no other known aircraft in the immediate area.
9. While on final approach, the aircraft descended considerably below the glide path and below the minimum altitude before reaching the middle marker.
10. Trees were struck six-tenths of a mile from the runway threshold approximately 200 feet below the glide path and 260 feet to the left of the extended centerline of the runway.



Probable Cause

The Board determines that the probable cause of this accident was that during the final portion of an ILS approach the pilot, for reasons not determinable, either permitted or caused the aircraft to deviate to the left of course and descend below the glide path to an altitude too low to clear ground obstructions.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHAN GURNEY

/s/ HARMAR D. DENNY

/s/ G. JOSEPH MINETTI

Durfee, Chairman, and Hector, Member of the Board, did not take part in the adoption of this report.

## S U P P L E M E N T A L   D A T A

### Investigation and Hearing

The Civil Aeronautics Board was notified of this accident at approximately 0400, December 21, 1955. An investigation was immediately begun in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. Six depositions were taken in Jacksonville, Florida, January 23, 1956; public hearing was held in Coral Gables, Florida, January 26 and 27, 1956; additional depositions were taken in Miami and Jacksonville, Florida, June 26 and 28, 1956.

### Air Carrier

Eastern Air Lines, Inc., is a Delaware corporation and maintains its principal office at New York, New York. The company possesses certificates of public convenience and necessity issued by the Civil Aeronautics Board and air carrier operating certificates issued by the Civil Aeronautics Administration which authorize the carriage of persons, property, and mail over the route described in this report.

### Flight Personnel

Captain Thomas Francis McBrien, age 43, was employed by Eastern Air Lines October 20, 1942, and promoted to captain May 29, 1946. He held a currently effective airman certificate with ratings of airline transport pilot, single- and multiengine land, DC-3, Martin 404, Constellation, and flight instructor. Captain McBrien had, according to company records, 12,052 hours of pilot time, of which 2,501 hours were acquired in Constellation aircraft. He passed a line check in L-749 aircraft on April 4, 1955, and an instrument check in L-1049 aircraft on July 22, 1955. His last first-class physical examination was passed August 31, 1955. Rest period prior to the subject flight was 16 hours.

Pilot John Jay Rinyu, age 37, was employed by Eastern Air Lines April 16, 1951. He held an airman certificate with ratings of commercial pilot, single- and multiengine land, and instrument. Pilot Rinyu had, according to company records, 9,522 hours of pilot time, of which 1,360 were acquired in Constellation aircraft. His last hood check was October 17, 1955, and he requalified on L-749 aircraft December 1, 1955. His last CAA first-class physical examination was passed April 1, 1954; therefore, he was not currently certificated according to Civil Air Regulations. A company physical was passed on August 25, 1955. Rest period prior to the subject flight was 16 hours.

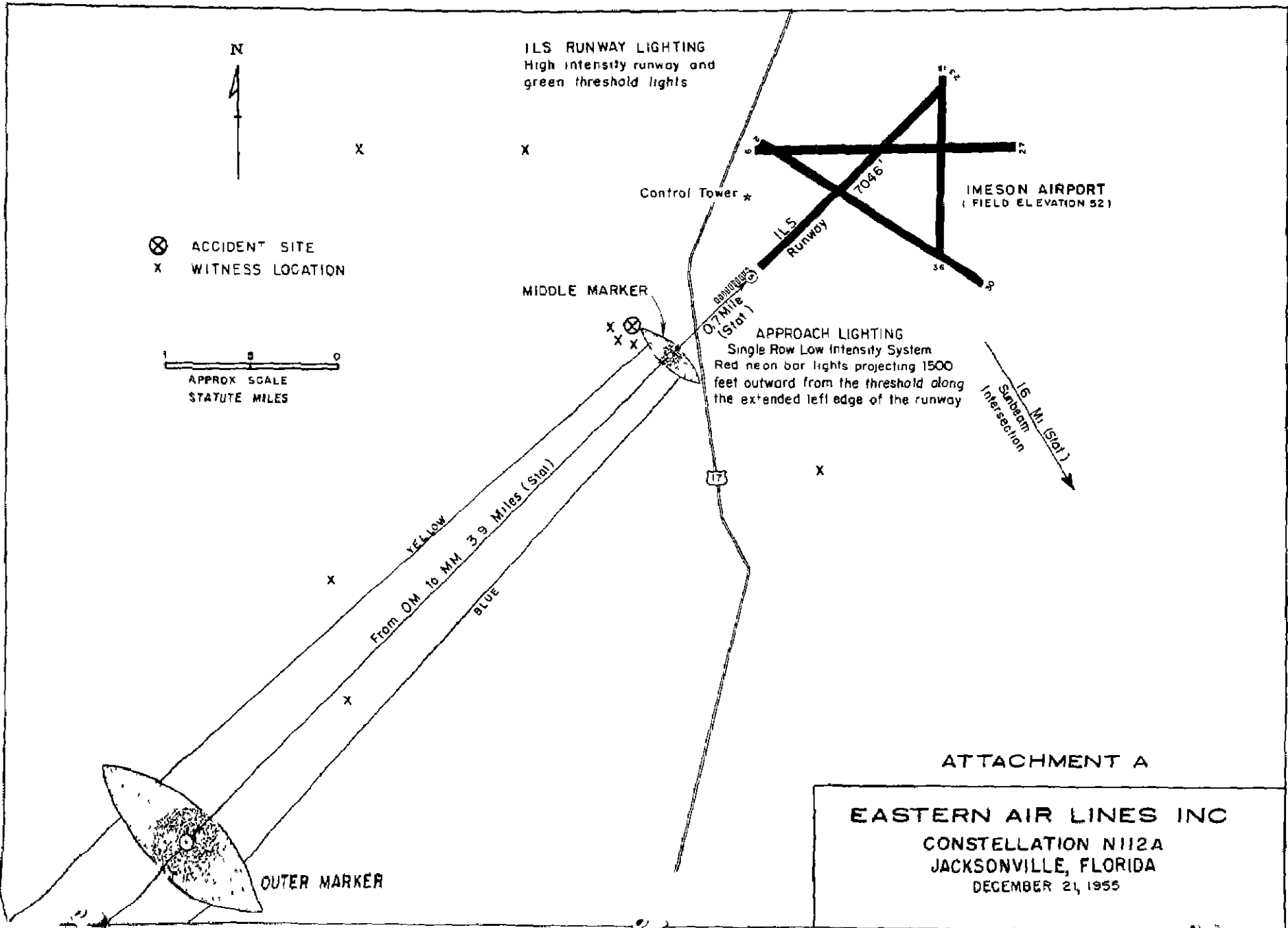
Flight Engineer Charles Calvin Devine, age 30, was employed by Eastern Air Lines May 9, 1955. He held a currently effective airman certificate with rating of flight engineer. Mr. Devine had, according to company records, a total of 332 hours flying time, all of which had been acquired in Constellations. He also had 4,800 hours as a flight mechanic in the U. S. Air Force. His last CAA physical examination was taken August 23, 1955. The date of his last line check was October 5, 1955. Rest period prior to the subject flight was 15 hours.

Flight Attendant Emma Elizabeth Williams, age 21, was employed by Eastern Air Lines February 16, 1955, as a student flight attendant and was promoted to flight attendant March 8, 1955.

Flight Attendant Clara Dorothea Rioseco, age 23, was employed by Eastern Air Lines, October 20, 1954, as a student flight attendant and was promoted to flight attendant November 8, 1954.

#### The Aircraft

N 112A, a Lockheed model L-749A Constellation, serial number 2533, was owned by Eastern Air Lines, Inc. Its manufacture was completed as a model 649-79-12 aircraft on August 1, 1947, and converted to a 749A on September 7, 1950, in accordance with CAA specification No. A763. Total flight time on the airframe was 29,941 hours. Powerplants were four Wright Aeronautical Cyclone engines, model 749C18391, equipped with Hamilton Standard model 43E60 propellers. Time since overhaul on the engines varied between 488 and 1,337 hours (approved time between engine overhauls is 1,925 hours). Time since overhaul on the propellers varied the same as on the engines (approved time between overhauls on propellers is 3,850 hours).



ATTACHMENT A

EASTERN AIR LINES INC  
 CONSTELLATION N112A  
 JACKSONVILLE, FLORIDA  
 DECEMBER 24, 1955