

CIVIL AERONAUTICS BOARD  
ACCIDENT INVESTIGATION REPORTAdopted: July 7, 1953Released: July 10, 1953EASTERN AIR LINES, INC., - MIDWAY AIRPORT, CHICAGO, ILLINOIS,  
MARCH 3, 1953The Accident

An Eastern Air Lines' Constellation Model L-1049, N 6214C, was involved in an accident while making a scheduled landing at Midway Airport, Chicago, Illinois, at 1352<sup>1/</sup>, March 3, 1953. There were 77 passengers including one infant, and a crew of six aboard, one passenger sustaining a superficial injury. Damage to the aircraft was confined mainly to propellers, flaps, engine nacelles and the bottom of the fuselage.

History of the Flight

Eastern Air Lines' Flight 104 of March 3, 1953, was a scheduled non-stop flight from Miami, Florida, to Chicago, Illinois. The crew consisted of Captain D. W. Brack, Pilot N. R. Lucas, Flight Engineer D. W. Rasmussen and Flight Attendants J. S. Gregg, R. A. Bray and M. A. Thompson. A Northwest Airlines' flight engineer, riding as an observer, occupied the jump seat on the flight deck. The total aircraft weight on departing Miami was 113,752 pounds, which was within the allowable gross limit of 115,903 pounds, and the load was distributed within certificated limits with respect to the center of gravity of the aircraft.

Immediately prior to departing Miami the right brake failed to release; this difficulty was promptly remedied and had no bearing on subsequent events. Flight 104 departed Miami at 1020 on an Instrument Flight Rules clearance to

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<sup>1/</sup> All times referred to herein are based on the 24-hour clock and are Eastern Standard with the exception of those reported in the Chicago area which are Central Standard Time.

Chicago to cruise at 19,000 feet above sea level. The flight was routine from Miami to the vicinity of Fort Knox, Kentucky, at which point light to moderate turbulence was encountered. In the vicinity of Indianapolis, Indiana, the fire warning bell sounded and the master fire warning light came on, indicating a possible fire in the left heater. This heater was turned off and the warning bell then stopped ringing and the fire warning light went off, indicating that there was no fire. No further difficulty was experienced with this unit.

At 1333, when the flight was nearing Chicago at 5,500 feet MSL, it was cleared by Air Route Traffic Control to the Kedzie low frequency radio beacon, to cross Lansing Intersection at 5,500 feet and to contact Midway Approach Control after passing Lansing. Ten minutes later, at 1343, the flight reported over Lansing at its assigned altitude. At this time radar contact was established and routine vector and descent instructions were issued by approach control. The flight was established on course nine miles southeast of the airport and at 1350 it reported over the Kedzie marker at 1,500 feet. At this time the flight was cleared to land on Runway 31 Left and the local weather was given as: Ceiling 700 feet, visibility one mile<sup>2/</sup>. Immediately after passing the Kedzie marker, the check list having been completed, the landing gear was lowered, the three green landing gear position indicating lights came on indicating that the gear was fully down and locked, and the hydraulic pressure gauge showed that the pressure was normal. When approximately one and one-fourth miles from the end of the runway, the radar operator who was monitoring the approach observed the aircraft had deviated approxi-

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<sup>2/</sup> The company's landing minima (day) for a straight-in ADF approach to Runway 31L are ceiling 400 feet, visibility one mile.

mately 800 feet to the left of course. The flight was immediately advised and the aircraft was observed to start a right corrective turn. During this turn the aircraft became visually contact and the captain said that he saw the tall chimney of the Cracker-Jack Factory (2200 feet from the end of the runway on a bearing of 179°) and had the runway clearly in sight. When the aircraft was approximately over the threshold of the runway, a steep left turn followed by a right turn was made for alignment. Competent witnesses said that this latter turn was made at an altitude of approximately 200 feet above the ground and the speed of the aircraft seemed to be in excess of that usually used by similar type aircraft approaching to land. The turn was completed and the aircraft was observed to touch down near the intersection of Runways 31L and 4L, which point is approximately two-thirds of the way down Runway 31L. Immediately after touchdown the aircraft was seen to skip and then settle, veer off the runway to the left, and come to rest on the bottom of its fuselage just beyond the end of the runway. There was no fire and the passengers were quickly evacuated.

The weather at the time of the accident was - ceiling measured 500 feet, overcast, visibility one mile with light rain, fog and smoke, wind north-northeast 13 miles per hour.

### Investigation

Midway Airport has an elevation of 618 feet. Runway 31L is macadamized and is 175 feet wide and 6,410 feet long. The distance from the approach end of this runway to the northwest or far side of its intersection with 4L is 4,000 feet. It was established that the aircraft touched down on the wet runway near this intersection. At a point approximately 2,000 feet beyond,

it skidded off the left side of the runway and across a broad taxi strip, coming to rest on the belly of the fuselage a few feet beyond and to the left of the end of the runway. Many marks made by propeller blades were found on the runway; these were first noticeable at a point 315 feet from the far side of the intersection some of which extended 1,430 feet farther on.

When the Board's investigator entered the cockpit, a few minutes after the accident, the landing gear control lever was in the "down" position and the flap indicator showed the flaps to be 80 percent down.

Investigation further revealed that all propeller blades were bent or broken and that the propeller hubs and actuating gears were damaged. Engines Nos. 1 and 4 sustained minor damage; Nos. 2 and 3 major damage. A portion of the fuselage belly was badly crushed and numerous holes were found in the right side of the fuselage, apparently caused by pieces of the broken propellers striking it; radio loops and antenna masts were broken off. The left wing received severe gouges in the lower plates of the No. 2 fuel tank; the leading edge was damaged inboard of the No. 2 nacelle and five flaps received major damage. The right wing received crushing damage to the leading edge both inboard and outboard of the No. 3 nacelle. Four flaps attached to this wing were distorted and damaged. The bottom tip of the right vertical stabilizer fin was badly damaged through collision with an elevated concrete taxiway directional arrow.

All doors of the main landing gear were damaged. The main landing gear was found fully retracted but the hydraulically operated wedges which

complete the final locking of the gear were not in place<sup>3/</sup>. The nose gear doors were damaged and the nose gear was retracted to within six inches of the full "up" position.

The aircraft was raised by means of air bags and jacks to a height which permitted full extension of the gears. As this was accomplished all three landing gears, which were resting on the ground, moved to the fully down and locked position. The aircraft was then towed to the hangar for additional tests. A small portion of the right main gear hydraulic up-line tubing located in the No. 3 nacelle, which was damaged at impact, was replaced. A section of the No. 3 nacelle hydraulic pressure line, pump to filter, also damaged by impact and which was leaking at the filter, was replaced. No hydraulic lines relating to the operation of the landing gears were found broken or leaking other than those described. Following the replacement of these parts the aircraft was raised on jacks and the landing gear cleared of ground contact. Auxiliary hydraulic and electrical units were coupled to the landing gear system and the gears were cycled fourteen times. All three landing gears operated throughout these tests completely without malfunction,

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<sup>3/</sup> Report No. 7788 - Maintenance Instructions Manual - Lockheed Aircraft Corporation. Hydraulic Operation. Main and Nose Gear Retraction.. With the landing gear selector valve in the "UP" position (not possible with the weight of the airplane on the gears) secondary pressure fluid is directed simultaneously to the downlocks, uplocks and piston-rod end of the gear actuating cylinders. The fluid enters each main gear actuating cylinder through a runaround valve attached to the cylinder. The downlock strut is free to move away from the lock shaft after the downlock release piston retracts and rotates the latch release sleeve against the spring-loaded latch. As the gear completes its up travel, the lug on the strut engages the uplock assembly. The spring-loaded jaws close around the lug and hold the gear up. At this point, hydraulic pressure forces the wedge assembly of the uplock cylinder into the scissors-like opening at the back side of the uplock jaws. The nine steel balls within the uplock cylinder are forced into position behind the wedge. The gear is held and locked mechanically since the uplock jaws cannot release until hydraulic pressure is applied to the extension or "down" side of the uplock cylinder to withdraw the wedge. Hydraulic flow is unrestricted during retraction or "up" movement of the gear.

The hydraulic sequence of operation for the nose gear is identical to that of the main gear.

either hydraulically or electrically, with regard to "up" and "down" gear locks, warning lights, and warning horn. The gear electrical system was then adjusted to simulate a condition of aircraft weight on the gears thus necessitating manipulation of the manual override of the locking pin through use of the locking pin release in order to retract the gears. In this configuration the gears were operated seven times without evidence of malfunction. Additional functional tests of the landing gear components were conducted at a subsequent date. Examination of these components and tests disclosed nothing which would have an adverse effect on their normal operation.

To better understand how the three landing gears are retracted from the cockpit a brief description follows. The landing gear control lever, or handle, is on the lower right side of the pilot's control pedestal and operates in a slot. Its travel is from "up" (landing gear up), through "neutral," downward to "down" (landing gear down) and back. This lever operates the hydraulic fluid selector valve by means of cables and linkage. To move the lever from the "down" to "up" position when the weight of the aircraft is not on the landing gears, the spring-loaded control lever is first pulled out and then moved upward to the neutral position. A stop prevents movement of the lever beyond "neutral" until a trigger adjacent to the lever is depressed. The handle then may be moved through its entire upward travel. If the weight of the aircraft is on the landing gear, upward movement of the landing gear control lever beyond "neutral" is prevented by a locking pin. This pin is held in place by the spring action of a spring-loaded solenoid. It is withdrawn to unlock the control gear when the solenoid is energized through the closing of a safety switch mounted at the torque arm of the right main landing gear shock-strut. This occurs when the weight of the aircraft is removed from the landing gear allowing extension of the

shock-strut. An override feature for manual withdrawal of the locking pin is also provided by means of a locking pin release which is located on the upper right side of the pilot's control pedestal. Once the locking pin has been withdrawn either electrically or manually, the control lever may be moved to the "up" position.

The Kedzie-ADF (Automatic Direction Finder) approach procedure, or back course ILS approach, as it is sometimes called, is described in an Eastern Air Lines' instrument approach chart as follows: Upon receiving a clearance from approach control to make this approach one of the aircraft's ADF receiver is tuned to 248 kc, the Kedzie MHW<sup>4/</sup> beacon and the signal "EDZ" is identified. Homing on the indications of the ADF pointer toward the facility the procedure calls for crossing it at 1,500 feet MSL. Then a track of 312<sup>0</sup> magnetic is made good to the threshold of Runway 31L, descending meanwhile to the authorized minimum altitude of 400 feet above field level. The distance from this beacon to the runway is 3.8 miles and the course to the field coincides with the back localizer course (reverse) of the Instrument Landing System. The ILS localizer is usually monitored as a secondary navigational aid; no glide slope is provided along the back side of the ILS system.

According to the crew, the aircraft was on course when it passed over the Kedzie marker; the flaps were at the take off position; one ADF was tuned to the Kedzie marker; the other ADF was tuned to the ILS outer marker and the ILS localizer was being used as a secondary aid. As previously stated,

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<sup>4/</sup> MHW is the designation for a non-directional radio beacon (homing with power less than 50 watts and without voice facilities).

the captain said that after passing the marker the landing gear was lowered,<sup>5/</sup> that he personally observed the three green landing gear warning lights were on and that the hydraulic pressure was normal. The captain then told the pilot to descend to an altitude of 400 feet above the ground. Pilot Lucas, who was flying from the right seat, made the descent. After the aircraft was leveled at 400 feet <sup>the ground,</sup> above~~the~~ the captain observed the air speed to be approximately 105 knots (121 miles per hour) and he immediately advised the pilot to apply more power. As sufficient power was not applied, the captain placed his hand over the pilot's hand, which was on the throttles, and advanced the throttles farther. The flight at this time was on instruments, and it was then that the captain noticed they were off course to the left and advised the pilot. As the right turn was started the flaps were lowered to the approach position, and the captain told the pilot that time was running out for arrival at the runway and that he had "better step on it." In explaining this, the captain said, "our time was just about out and still 400 feet and still on instruments and no visual contact of the ground at all," also that the time to make the approach was one and one-half minutes and that their air speed inbound was from 100-125 knots (115-144 miles per hour)<sup>6/</sup>. The flight was advised at this time by approach control that it was 800 feet to the left of course and one-fourth of a mile from the end of the runway. The crew did not acknowledge this transmission.

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5/ Eastern Air Lines Flight Navigation Manual 8-3. GEAR EXTENSION. Range Approach: When a normal straight-in landing is to be made from a range approach the landing gear on any type of EAL equipment will be extended immediately after the completion of the procedure turn, or, on crossing the station, at the discretion of the captain. If no procedure turn is required, gear will be extended on final approach when approximately 10 miles from the airport.

6/ Eastern Air Lines' approved ADF Instrument Approach Chart indicates approach time from Kedzie to runway 1.31 minutes at 130 knots (150 miles per hour).



At approximately half-way through the corrective right turn Captain Brack applied more power and remarked to the pilot, "we might have to go around." Immediately following this remark, visual contact with the ground was established. During the steep left turn for alignment with the runway the pilot said that he lowered the flaps to the 80 percent down position. As this turn was being made the captain told the pilot to make the turn a little steeper and said, "you are not lined up." This was done and when an additional right turn was made the aircraft was aligned with the runway.

Captain Brack said that considerable power was maintained until landing; that the touchdown was normal except for a slight bounce; that immediately following touchdown he applied reverse thrust to all four engines and that the four amber propeller reverse pitch warning lights came on. Pilot Lucas said, "the next thing I knew we were getting these prop nicks on the runway." Both the captain and pilot said that they did not touch the landing gear control lever after the gear was lowered during the approach. This was the second trip the captain had made with Pilot Lucas; the first was several months earlier.

According to the information furnished by the manufacturer of the subject aircraft, the approximate minimum stopping distance on a wet macadamized runway, gross aircraft weight 98,500 pounds<sup>7/</sup>, indicated air speed 110 m.p.h. in landing configuration, is 3,320 feet with maximum braking effectiveness. The nearly cross wind of 13 m.p.h. from the north-northeast, as was the case when this aircraft landed, can be considered negligible as far as it affected stopping distance. Under the same conditions the maximum stopping distance

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<sup>7/</sup> The estimated gross weight of the aircraft on arrival at Chicago.

would be reduced about 50 percent to 1,660 feet if maximum reversing and braking effectiveness are both obtained.

### Analysis

#### Approach and Landing:

From a study of the testimony of the crew it is apparent that the approach to Chicago was not made in accordance with the company's approved approach procedure. The company's flight manual states in part that when executing an IFR straight-in approach the landing gear will be extended when approximately 10 miles from the airport. In this case, the gear was not lowered until the aircraft was over the Kedzie marker, 3.8 miles from the airport. Lowering the gear this late might not allow sufficient time to stabilize air speed, power settings, and rate of descent for a smooth coordinated approach. This may account for the wide range in air speeds (100-125 knots) and throttle adjustment which followed. The manual further states that for a gear-down descent in final letdown (from Kedzie) 22 inches of manifold pressure and an air speed of 120 knots will establish a rate of descent of 400 feet per minute, also, that 30 inches of manifold pressure and 130 knots should be maintained for level flight following the descent. It is apparent that the pilot was not following established procedure since the captain deemed it necessary because of low air speed personally to add power immediately following the aircraft's return to level flight.

The fact that the aircraft was permitted to deviate 800 feet to the left of course shows lack of alertness on the part of the crew since such a deviation would be clearly indicated by appreciable deflection of ADF needle. In addition, when close-in to the airport the ILS localizer needle would indicate a full deflection to the left, or blue. Under these conditions Captain Brack should have taken over the controls.

Furthermore, as visual contact was established at an altitude of 400 feet above the ground, approximately 2,200 feet from the end of the runway and since the aircraft was not properly aligned with the runway, it would appear that a missed approach procedure should have been immediately initiated. The dual handling of the power settings, the captain's statements, "better step on it" and "we might have to go around," coupled with the necessity for close-in steep turns for alignment with the runway thereby requiring the application of considerable power until touchdown all demonstrate the lack of complete crew coordination.

Retraction of the Landing Gear:

According to the crew the landing gear was in the "down" position and locked at the time of touchdown as indicated by the three green landing gear position indicating lights, and the gear control lever was not touched after it was placed in the "down" position. Since comprehensive tests of the landing gear system made subsequent to the accident showed it to function in a normal manner, it is difficult to reconcile the crew's statements with what actually occurred. According to the manufacturer's maintenance manual, it is necessary for hydraulic pressure to be applied to the up lines of the landing gear hydraulic system to remove the down locks, thus permitting the gears to be raised. This is normally accomplished by moving the control lever to the "up" position.

Since no malfunctions were found which would cause the gears to retract when once down and locked, it appears that in this case the landing gear control lever must have been raised by some member of the crew. Also, this action must have been taken when sufficient weight to actuate the safety switch was not on the gears; i.e., during the skip (bounce).

Findings

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

1. The carrier, the crew and the aircraft were properly certificated.
2. During the approach the pilot was sitting in the right seat and was flying the aircraft; the captain in the left seat was monitoring the pilot's approach.
3. At the time of the accident the weather was reported as ceiling measured 500 feet, overcast, visibility one mile with light rain, fog and smoke, wind north-northeast 13 miles per hour.
4. When the landing gear was lowered the green position indicating lights came on, indicating the gear was fully extended and locked, pressure was normal.
5. An improperly executed approach was made and the aircraft was landed with excessive speed too far down the runway.
6. After the landing was effected and during the landing roll, the entire landing gear retracted.
7. The landing gear was found capable of functioning in a normal manner when tested after the accident.

Probable Cause

The Board determines that the probable cause of this accident was an improperly executed approach resulting in excessive speed and a landing too far down the runway to permit normal stopping.

BY THE CIVIL AERONAUTICS BOARD:

/s/ OSWALD RYAN

/s/ HARMAR D. DENNY

/s/ JOSH LEE

/s/ JOSEPH P. ADAMS

/s/ CHAN GURNEY

## S U P P L E M E N T A L   D A T A

### Investigation and Hearing

The Civil Aeronautics Board received notification of the accident through CAA Communications at Chicago at 1049, March 3, 1953. An investigation was immediately initiated in accordance with the provisions of Section 702 (a) (2) of the Civil Aeronautics Act of 1938, as amended. A public hearing was held in connection with the investigation of this accident at Chicago, Illinois, March 19, 20 and 21, 1953.

### Air Carrier

Eastern Air Lines, Inc., is a Delaware corporation with its principal place of business at Miami, Florida. Eastern Air Lines possesses a certificate of public convenience and necessity issued by the Civil Aeronautics Board and an operating certificate issued by the Civil Aeronautics Administration. These certificates authorized the carriage of persons, property, and mail over the routes described in this report.

### Flight Personnel

Captain David W. Brack, age 40, was employed by Eastern Air Lines June 28, 1940. He was the holder of a valid airman certificate with an airline transport and appropriate aircraft rating. Captain Brack had a total of 11,655 flying hours, of which 818 were in Constellation type aircraft and 258 were in a Constellation Model 1049. His last instrument check was accomplished November 26, 1952. His last CAA physical examination was successfully passed January 21, 1953.

Pilot Nelson R. Lucas, age 33, was employed by Eastern Air Lines July 22, 1946. He held an airman certificate with a commercial pilot, multi-engine land and instrument ratings. He had a total of 7,415 flying hours, of which 1,639 were in Constellation type aircraft and 564 were in a Constellation

Model 1049. His last CAA physical examination was successfully passed April 25, 1952.

Flight Engineer Dudley W. Rasmussen, age 31, was employed by Eastern Air Lines January 4, 1949. He held a currently effective flight engineer certificate. Since being employed by Eastern Air Lines he had flown in Constellation type aircraft 3,831 hours, of which 845 were in the Constellation Model 1049. His last CAA physical examination was accomplished January 30, 1953.

The other crew members were Flight Attendants John Gregg, Anne Bray, and Martha Ann Thompson.

#### The Aircraft

N 6214C, a Lockheed Constellation Model 1049, was manufactured March 8, 1952. An examination of all historical maintenance and inspection records of this aircraft disclosed no items which had any particular significance in respect to this accident.