

# AIRCRAFT ACCIDENT REPORT

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ADOPTED. January 20, 1966

RELEASED. January 25, 1966

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NORTHEAST AIRLINES, INC.  
DOUGLAS DC-6B, N8221H,  
LAGUARDIA AIRPORT, NEW YORK  
JUNE 5, 1964

## SYNOPSIS

Northeast Airlines, Inc., Flight 715, a DC-6B, scheduled between Lebanon, New Hampshire, and LaGuardia Airport, New York via Boston, Massachusetts, struck a dike during a visual landing approach to runway 31 at LaGuardia Airport on June 5, 1964, at 1234 e d t.

Weather conditions prevailing at the time of the accident were high thin scattered clouds, 15 miles visibility, wind from 300 degrees at 10 knots.

The aircraft's two main landing gears separated from the aircraft on impact with the dike, however, the aircraft remained right-side-up and there was no fire. Evacuation of the 39 passengers and four crew members was both rapid and orderly, and there were no injuries.

The Board determines that the probable cause of this accident was the failure of the captain properly to plan and execute the final approach.

## INVESTIGATION

### 1.1 History of Flight

Northeast Airlines, Inc., Flight 715, a Douglas DC-6B, N8221H, operating as a regularly scheduled passenger flight from Lebanon, New Hampshire, to New York City, New York, via Boston, Massachusetts, struck a water retaining dike with its main landing gear during a visual landing approach to runway 31 at LaGuardia Airport, New York, on June 5, 1964, at 1234 e.d.t.<sup>1/</sup> The Visual Approach Slope Indicator (VASI)<sup>2/</sup> was being utilized

Flight 715 originated in Lebanon, New Hampshire, on June 5, 1964, and proceeded routinely to Logan International Airport, Boston, Massachusetts, where a scheduled

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<sup>1/</sup> All times herein are eastern daylight based on the 24-hour clock.

<sup>2/</sup> The LaGuardia VASI installation is described on Page 5 of this report

crew change was effected. There were no mechanical discrepancies reported nor was any aircraft maintenance performed at Boston.

The flight departed Boston at 1133 for LaGuardia Airport on an Instrument Flight Rules (IFR) clearance to maintain 8,000 feet.

Flight 715 proceeded normally to the New York area and canceled the IFR flight plan with the New York Air Route Traffic Control Center approximately 25 miles from the LaGuardia Airport. (Visual flight conditions prevailed along the route of flight and in the New York area.)

In the vicinity of Stamford, Connecticut, the flight contacted LaGuardia approach control and was informed that runway 31 was in use. The flight was also given the current field NOTAM<sup>3/</sup> which was: ". . . runway three one landing length five thousand eight hundred and thirteen feet, men and heavy equipment at the departure end of the runway, cranes within one-quarter mile up to one hundred feet in height "

When over New Rochelle, New York, the flight contacted LaGuardia Tower and was instructed to report over the field for landing on runway 31.

The captain stated that in the vicinity of Eastchester Bay, at an altitude of approximately 4,000 feet, the flaps were extended to the 20-degree position. When about 1-1/2 miles west of the airport, at an altitude of approximately 3,500 feet, the aircraft was turned onto the downwind leg. The LaGuardia Tower then cleared the flight to land on runway 31 noting that the aircraft appeared to be "high" in the traffic pattern.

Wing flaps were lowered to the 25-degree position on the downwind leg and the aircraft was turned onto the base leg approximately two miles south of the airport at an altitude of approximately 2,000 feet. The landing gear was then extended and the landing checklist completed. Following this, the flaps were lowered to the 30-degree position.

As the aircraft was turned onto the final approach the propellers were advanced to 2300 r.p.m. At an altitude of approximately 1,000 feet the flaps were lowered to 40 degrees. The captain stated that at this point he noticed that the VASI lights were on and that both sets of light bars were indicating white. When the aircraft was an estimated 1-1/2 miles from the approach end of runway 31 at an altitude of approximately 600 feet, the upwind lights were observed to progressively change from pink to red with the downwind lights remaining consistently white. The captain stated that it was at this point he decided to utilize the VASI lights to establish the final approach flightpath. He further stated that the airspeed was then about 120 knots and that he adjusted the rate of descent so as to remain on the VASI approach path.

As the aircraft approached the runway threshold the captain called for 50 degrees of flaps. The first officer stated that he then placed the flap selector

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3/ NOTAM - Notice to Airmen.

lever in the 50-degree detent. The flight engineer verified that the flap selector lever was placed in the 50-degree detent by the first officer. He also observed the flap indicator move downward and the hydraulic quantity and pressure indicators stabilize. The captain then fully retarded engine power and simultaneously raised the nose of the aircraft in an attempt to reduce air-speed from 115 knots to the boundary speed of 100 knots.

The captain further stated that his visual observations of the VASI lights were then limited to the downwind units which were, as they had been throughout the approach, indicating steady white.

As the aircraft passed over the water retaining dike located ahead of the runway threshold a "thump" was heard or felt by the crew. With regard to this occurrence, the captain stated, ". . . there was no change of any sort other than the thump, either the sound or the feeling - I believe it was feeling probably more than sound . . . I was aware that the aircraft had struck something I was quite surprised, and the first officer made the statement that, 'I think we might have blown a tire' . . . after we were in what I was considering the landing, and I thought the gear was still with us . . ."

The aircraft continued ahead, initially touching down on its left main shock strut 1,164 feet from the runway threshold (The entire right main landing gear assembly, and the wheel axle, and lower strut components of the left main landing gear assembly, separated from the aircraft on impact with the dike.)

### 1.2 Injuries to Persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Others</u>
Fatal	0	0	
Non-fatal	0	0	
None	4	39	

### 1.3 Damage to Aircraft

The aircraft was damaged substantially; however, it remained essentially intact. There was no fire.

### 1.4 Other damage

Minor damage incurred by a water retaining dike struck by the aircraft landing gear.

### 1.5 Crew Information

Captain Karl F. Ritz, age 43, had a total of 13,661 flying hours with Northeast Airlines, Inc., of which 3,390 hours were in DC-6B aircraft. He held airline transport certificate No. 80767 with numerous ratings, among which was the DC-6. His last proficiency check in the DC-6 was on April 2, 1964, and his last line check in the DC-6 was conducted on December 6, 1963.

Captain Ritz satisfactorily passed a first-class FAA flight physical on April 15, 1964.

His rest period prior to the start of this flight was in excess of 24 hours.

First Officer Gaetano M. Zompetti, age 38, had a total of 6,617 flying hours with Northeast Airlines, Inc., of which 3,390 hours were in DC-6B aircraft. He held airline transport certificate No. 512340 with ratings for the DC-3 and Vickers Viscount 745D. His last proficiency check in the DC-6 was on June 8, 1963.

First Officer Zompetti satisfactorily passed a first-class FAA flight physical on August 12, 1963.

His rest period, prior to the start of this flight, was in excess of 24 hours

Flight Engineer John R. Riffle, age 31, had a total of 4,013 hours as flight engineer with Northeast Airlines, Inc., of which 2,768 hours were in DC-6B aircraft. He held flight engineer certificate No. 1403263. His last proficiency check in the DC-6 was on May 5, 1964, and his last line check in the DC-6 was on November 8, 1963.

Flight Engineer Riffle satisfactorily passed a first-class FAA flight physical on August 30, 1963. His rest period prior to the start of this flight was in excess of 24 hours.

Stewardess Barbara Finlay was regularly employed by Northeast Airlines, Inc., and had satisfactorily completed company training on emergency procedures including evacuation.

#### 1.6 Aircraft Information

N8221H was a Douglas DC-6B, serial No. 43738. It was manufactured August 12, 1952, and at the time of the accident had a total operational time of 31,383 hours. Maintenance had been current and in compliance with FAA requirements.

The four engines were Pratt and Whitney model R2800-CB16. Propellers were Hamilton Standard, model 43E60. Maintenance of powerplants and their components had been current and in accord with FAA requirements. The gross weight of the aircraft at takeoff from Boston was computed to be 78,444 pounds. This weight and the computed center of gravity (c.g.) of 21.0 percent mean aerodynamic chord were both within prescribed limits. The aircraft's weight and c.g. were also within allowable limits at the time of the accident.

#### 1.7 Meteorological Information

At 1238 the U. S. Weather Bureau at LaGuardia Airport recorded a surface weather observation following the accident (1234). This observation was in

part high thin scattered clouds, visibility more than 15 miles, temperature 65°F., dewpoint 36°F., wind 300 degrees at 10 knots, altimeter setting 30.16 inches

The accident occurred during daylight hours under sunny sky conditions

### 1.8 Aids to Navigation

Runway 31 at LaGuardia is not equipped with an instrument landing system (ILS) however, it is served by a VASI installation.

VASI is designed to provide, by visual reference, the same information that the glide slope unit of an ILS provides electronically. It provides a visual lightpath within the approach zone, at a fixed plane inclined at 2-1/2 degrees to 4 degrees from horizontal which an approaching pilot can see and utilize for descent guidance during an approach to a landing. The element of centerline guidance is obtained from reference to the runway lights.

The installation on runway 31 at LaGuardia consists of twelve light source units arranged in light bars with three units placed on each side of the runway opposite the 800-foot mark and three on each side of the runway at the 1,500-foot mark. (See Attachment #1 ) These are the downwind and upwind bars, respectively. The visual glide slope reference point is midway between the upwind and downwind bars.

The basic principle of the VASI is that of the color differentiation between red and white. Each light unit is equipped with a red filter positioned so as to project a low beam sector of red and a high beam sector of white with a center transitional area of pink.

When on the proper glidepath the pilot is in effect overshooting the bars near the threshold and undershooting the bars further down. Thus, he will see the downwind bars as white and the upwind bars as red. A position below the glidepath will cause both bars to be red and a high position will cause both bars to be white. Impending departure from the glidepath is indicated to the pilot with the transition of color from red through pink to white or vice versa. A movement to the high side will cause the upwind bars to change from red through pink to white. A descent below the glidepath will change the downwind bars from white through pink to red. When the pilot is below the glidepath the pair of red bars visible on each side of the runway will tend to merge into one bold red signal on each side of the runway if descent continues to be excessive and takes the pilot well below the glidepath.

The VASI can normally be seen at the approximate range of the outer marker (4-5 miles) and at greater distances at night. Under sunlight or snow conditions the range is decreased to about 3.5 miles. In haze and dust conditions or when an approach is made into the sun the white bars of the system may appear yellowish. This is also true at night when the VASI system is

operated at a low intensity. Certain atmospheric debris may give the white lights an orange or brownish tint. However, the red lights are not affected and the principle of color differentiation is still applicable.

Following the accident, Federal Aviation Agency (FAA) Systems Maintenance personnel ground checked the runway 31 VASI installation for proper operation and approach slope alignment. All light units, with the exception of the in-board unit on the right side downwind bar, were within proper tolerances.<sup>4/</sup> This unit was found at a setting of 2.5 degrees. However, it should be noted that one unit out of tolerance does not affect the overall operation of the system.

Approximately six hours after the accident the FAA conducted a flight check on the VASI in which the light intensity, glide slope angle, angular coverage, and obstruction clearances were inspected. The report of this check showed all of these items to be satisfactory with a computed glide slope angle of 2.90 degrees.

The on-glidepath corridor or wedge is 42 feet thick directly above the dike on the approach end of runway 31. The bottom of this wedge is 38 feet above the top of the dike.

The physical dimensions of the DC-6B are such that the distance from the fuselage reference plane to the ground is 8 feet 10 inches, and the distance from the fuselage reference plane to the pilot's eye level is approximately 4 feet 6 inches. The total measurement from pilot's eye level to the bottom of the main landing gear wheels is approximately 13 feet 4 inches.

The pertinent Federal Aviation Regulation (FAR) relating to the utilization of a VASI system is FAR 91.87(d)3. It states, "an airplane approaching to land on a runway served by a visual approach slope indicator shall maintain an altitude at or above the glide slope until a lower altitude is necessary for a safe landing."

### 1.9 Communications

All air/ground communications were conducted in accordance with applicable regulations.

### 1.10 Aerodrome and Ground Facilities

LaGuardia Airport is bounded on three sides by water. Because the surface of the airport is located at a height nearly level with the water, a dike has

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<sup>4/</sup> The VASI glide slope for runway 31 is attained by adjusting each light unit to a predetermined angular setting. Settings are 3.13 degrees for the upwind units and 2.63 degrees for the downwind units. These diverging angular settings produce a wedge-shaped band or lightpath. The centerline of the wedge is at a theoretically effective visual approach angle of 2.88 degrees. From anywhere within this wedge-shaped band the downwind lights appear white and the upwind lights appear red.

been constructed around the shoreline to prevent flooding. This dike is approximately 250 feet from the threshold and stands approximately six feet above the runway surface. It has a steel retaining wall painted with red and white crosshatching facing the water.

Runway 31 is 5,965 feet long and 150 feet wide. However, the useable landing length was restricted to 5,813 feet due to construction work in progress on the far end of the field involving the use of pile drivers and cranes. This information was contained in issued NOTAMS and was also included in tower transmissions to landing aircraft.

#### 1.11 Flight Recorder

A flight recorder was not required nor was one installed in this aircraft.

#### 1.12 Wreckage

Investigation revealed that both main landing gear wheels struck the dike about one foot below its top, with the impact points bracketing the extended centerline of the runway. As previously stated, the entire right main landing gear assembly, and the wheel axle, and lower strut components of the left gear separated from the aircraft at impact. The nose landing gear was intact and locked in the down position.

Initial contact with the runway was made by the shock strut of the left main landing gear 1,164 feet from the threshold. The aft fuselage section contacted the runway 1,800 feet from the threshold. The aircraft slid down the runway coming to rest just off the right edge at a distance of 3,400 feet from the threshold on a heading of approximately 325 degrees. Slash marks made by the No. 4 propeller appeared 1,900 feet from the threshold and 500 feet farther were marks made by the No. 3 propeller. There were no marks made by, nor tip damage to Nos. 1 and 2 propellers.

The wing flaps were found in the 20-degree extended position and the cockpit flap indicator corresponded to this position. The flap selector lever in the cockpit was positioned at the full up setting.

The right wing flap was twisted upward and torn outward, the center of the damage being 8 feet 2 inches from the fuselage, almost directly behind the right main landing gear. There were two tire marks 1 foot 2 inches upward from the trailing edge of the flap. These marks were 2 feet 11 inches apart, the center-to-center distance between the two tires of each main landing gear is 2 feet 11 inches. Both flap actuator rods were straight.

The left flap was relatively intact and was not torn. There were two indentations with tire marks, the most inboard being 8 feet 3 inches from the fuselage. This pair of indentations was in back of, and corresponded with, the left main landing gear wheels. The inboard portion of the flap was abraded on the lower trailing edge. The inboard flap cylinder actuator rod had a gradual slightly downward bend, the center of which was seven inches from the rod

eye fitting jam locking nut. (Seven inches of inboard actuator extension for a normal flap operation corresponds to 20 degrees of flap extension.)

The hydraulic lines leading to the left and right main landing gear were failed in tension at the main landing gear struts. Hydraulic lines throughout the wing flap system were intact with no visible external fluid leakage. The hydraulic system reservoir was checked and the fluid measured about 1-1/2 inches up on the sight gauge. This level corresponds to a nearly full system reservoir.

The aircraft's flight control system was inspected and found to be intact and capable of proper operation.

### 1.13 Fire

There was no fire.

### 1.14 Survival Aspects

The aircraft did not burn nor was there any major structural breakup on impact or during the ground slide. All of the passengers left the aircraft via the main cabin door within an estimated two minutes. The evacuation was orderly and was supervised by the stewardess and the flight engineer. The emergency chute was attached and unfolded, however, because the aircraft was so close to the ground, it could not be utilized as an aid in the aircraft evacuation.

### 1.15 Tests and Research

The wing flap control valve was functionally tested and found to be in satisfactory operating condition except for slightly excessive internal leakage with the sliding control valve in the neutral position. However, it should be noted that with system pressure being maintained, the flap follow-up linkage would compensate for this leakage by redirecting pressure to the actuator down line thereby maintaining any pre-selected flap position.

The two-speed flap control valve was tested and found capable of proper operation.

Flap extension tests were conducted on the aircraft and it was found that maximum flap extension attained, with the flap selector lever in the full down or 50-degree position, was approximately 44 degrees down.

The pilot and copilot airspeed indicators and altimeters were tested and found to be satisfactory in all respects.

### 1.16 Supplemental Data

The Civil Aeronautics Board was notified of this accident immediately after occurrence and an investigation was started at once under the provisions of Title VII of the Federal Aviation Act of 1958, as amended. Depositions

were taken in this matter at New York, New York, on June 19, 1964.

Northeast Airlines, Inc., is a Massachusetts corporation with its principal office in Boston, Massachusetts. The corporation holds a certificate of public convenience and necessity issued by the Civil Aeronautics Board and an air carrier operating certificate issued by the FAA. These certificates allow the carrier to engage in air transportation of persons, property, and mail over the route involved.

## 2.1 Analysis

The flight was routine from Boston to LaGuardia where a higher than normal traffic pattern for runway 31 was established.

It was stated by the captain that the VASI approach path was intercepted on final approach at an altitude of approximately 600 feet about 1-1/2 miles from the threshold. He further stated that the remainder of the approach was made utilizing the VASI and that "on-glidepath" color indications were observed up to the time of impact with the dike.

Inasmuch as the VASI system was operating satisfactorily at the time of the accident, as determined by the investigation, the captain's testimony of receiving the proper on-glidepath color indication is not compatible, and cannot be reconciled with the aircraft's striking the dike. Even if the aircraft was flown at the lower limits of the glidepath, that is to say with the pilot's eye level at the bottom of the wedge-shaped band of the proper on-glidepath light array, there still would have been approximately 24 feet remaining between the top of the dike and the bottom of the main landing gear.

Therefore, the Board believes that the captain did not properly utilize the VASI system during the final phase of the approach.

Careful examination of the aircraft's hydraulic system failed to reveal any significant defect, such as appreciable leakage, which might have allowed an unwanted partial flap retraction. The only positive evidence of the degree of flap extension at impact was the left inboard flap actuator rod which had a slight gradual bend with its center seven inches from the rod eye fitting jam locking nut. This damage occurred when the aircraft contacted the runway exerting an upward force on the flaps thereby creating a compressive load in the actuator rod greater than its column strength. Seven inches of inboard actuator rod extension corresponds to 20 degrees of flap extension, therefore, the flaps would necessarily have been extended more than 20 degrees when this damage occurred.

Based on the crew's testimony wherein the captain stated that he called for full flaps shortly before the aircraft contacted the dike, as well as the flight engineer's confirmation of the 50-degree flap selection being accomplished it is strongly indicated that the flaps were in the full down or near full down

position at the time of impact with the dike. The flaps were found at the 20-degree extended position at the accident site with the cockpit flap selector lever in the full "up" position. This 20-degree flap position would have been attained, subsequent to impact, either through the inadvertent or accidental placement of the selector lever to the "up" position, through the interruption of system pressure when the hydraulic lines were ruptured, or a combination of the two

Therefore, it is believed that there was no change in the flap position prior to impact with the dike that would have caused an unexpected loss of altitude or that would have been in any way contributory to this accident.

It was not determined how the selector lever reached the "up" position. The only logical explanation would be the inadvertent or accidental placement of the lever to that position during the crew's hurried egress from the aircraft.

## 2.2 Conclusions

In view of the foregoing, the Board concludes that the aircraft was flown at too low an altitude during the final portion of the landing approach to allow reasonable clearance of the dike.

## Probable Cause

The Board determines that the probable cause of this accident was the failure of the captain properly to plan and execute the final approach.

BY THE CIVIL AERONAUTICS BOARD:

/s/ CHARLES S. MURPHY  
Chairman

/s/ ROBERT T. MURPHY  
Vice Chairman

/s/ G. JOSEPH MINETTI  
Member

/s/ WHITNEY GILLILLAND  
Member

/s/ JOHN G. ADAMS  
Member

# VISUAL APPROACH SLOPE INDICATOR (VASI) RUNWAY 31 LAGUARDIA AIRPORT, NEW YORK

