

CIVIL AERONAUTICS BOARD
ACCIDENT INVESTIGATION REPORT

Adopted: November 14, 1952

Released: November 18, 1952

NORTHEAST AIRLINES, INC. - NEAR LA GUARDIA FIELD, NEW YORK,
JANUARY 14, 1952The Accident

Northeast Airlines' Flight No. 801 of January 14, 1952, crashed in Flushing Bay, New York, about 3,600 feet northeast (short) of Runway No. 22 of LaGuardia Field at about 0903. ^{1/} Five of the 33 passengers were seriously injured; all others and the three crew members were slightly injured. The Convair, Model CV-240, N 91238, received major damage by impact, immersion and subsequent salvage operations.

History of the Flight

Flight 801 originated at Boston, Massachusetts, for LaGuardia Field, nonstop, with a crew of Captain A. V. R. Marsh, First Officer Austin E. Briggs, and Stewardess Carolyn M. Hull. It departed Boston at 0745, as scheduled, in accordance with Instrument Flight Rules, via Airways Amber 7 and Red 3 to LaGuardia. Idlewild (New York International) Airport was the specified alternate. Upon departure from Boston the aircraft's gross weight was 38,623 pounds, with a maximum allowable weight of 39,650 pounds, and the center of gravity was within prescribed limits.

The flight proceeded uneventfully at its assigned altitude of 6,000 feet MSL in instrument weather with almost continuous rain. No actual icing occurred although the aircraft's de-icing equipment was used as a precaution because of the near freezing air temperatures. All required position reports were routine. At approximately 0845, the flight contacted LaGuardia approach

^{1/} All times referred to herein are Eastern Standard and based on the 24-hour clock.

control and advised, "Northeast 801 over New Canaan - cleared to New Rochelle." (The flight had been cleared to New Rochelle by ARTC.) Approach control then requested the flight to report over the Port Chester, New York, fan marker, and gave it an expected approach clearance time of on the hour (0900), Runway 22, and the 0828 LaGuardia weather, as follows: "estimated 3,000 overcast, one and one-half miles, rain and smoke, Wind southeast six, altimeter zero-zero-zero" (30.00). The flight reported over Port Chester at 0849 and was successively cleared to descend to 4,500 foot, to 3,500 foot, and to 2,500 foot altitudes. At 0855 it was cleared to leave New Rochelle, inbound, and shortly was instructed to make a 360-degree turn to assure separation from a preceding aircraft. The flight acknowledged and complied. At 0858 it reported leaving New Rochelle and was cleared for an approach to Runway 22, and at 0859, was told that Ground Control Approach advisories were available on a frequency of 109.9 megacycles. The flight acknowledged, and then was given the 0900 LaGuardia weather, ceiling 1,700 feet and visibility $1\frac{1}{2}$ miles. Flight 801 reported leaving the LaGuardia range at 0900 and was cleared to land on Runway 22.

There was no further message from the flight. At 0903 it struck the water of Flushing Bay some 3,600 feet from the approach end of Runway 22. A motorboat operated by the Edo Corporation, docked about one-half mile away, reached the site approximately four minutes later. Passengers and crew, who had climbed out through the emergency exits and who were standing on and holding to the fast sinking aircraft, were taken aboard and then transferred to a tugboat that arrived shortly. All occupants were taken ashore and hospitalized.

Investigation

The pilots were not seriously hurt and it was therefore possible, from their testimony and that of the passengers, to reconstruct the flight's final approach with considerable accuracy. There were no eye-witnesses to the accident.

Investigation disclosed that Captain Marsh, a company Convair captain and check pilot, occupied the right-hand seat during this flight. His piloting experience was extensive with a total of nearly 14,000 hours, of which nearly 2,400 had been on Convairs. He testified that he had made an estimated five or six instrument approaches to LaGuardia each month during the preceding ten years.

First Officer Briggs was making the approach. His flying experience was also extensive. It included 2,800 hours as copilot on DC-3's, 300 as copilot on DC-4's, 124 as a company DC-3 captain, about 500 as a Navy DC-3 (R4D) captain, and 700 as copilot on convairs. His total piloting time was about 5,100 hours. At the time of this accident he was completing his sixth week flying as a Convair trainee-captain under the supervision of Captain Marsh. This was in accord with the company's policy of requiring a minimum of one month of such flying before copilots are eligible for upgrading. Because there was no captain vacancy immediately available, Briggs had continued in training at his own request. He had a total of 83 hours as a Convair trainee-captain, of which 66 hours had been during the past 30 days. According to the check pilot, Captain Marsh, he had satisfactorily completed his line flight training for Convairs. The company operation manual requires a minimum of 10 hours specialized training. This is completed after

the required 30 days' line training. In this instance, the final check had not been given Copilot Briggs but was to be given him before the company formally rated him as a Convair captain. However, he had successfully completed the company's ground training program as set forth in the company's operational manual.

The authorized minimums for a straight-in approach to Runway 22 at LaGuardia for the subject aircraft are 500-foot ceiling and one mile visibility. The last report given the flight concerning LaGuardia weather for the 0900 sequence was, "estimated 1700 broken, one and one-half miles, . . ."

The standard range approach calls for passing over the range station, in line with and located 3.2 miles from Runway 22, at an altitude of 800 feet. With landing gear lowered and with wing flaps extended $21\frac{1}{2}$ degrees, the rate of descent would be about 600 feet per minute with the air speed at 140 miles per hour. The intervening distance from range to runway is over water. The crew testified that the range was crossed at 800 feet altitude, whereupon the landing gear was lowered and the flaps were extended $21\frac{1}{2}$ degrees.

Captain Marsh testified that he first had visual contact with the lights on the approach end of the runway at an altitude of 500 feet, and so advised Briggs, who was making the approach on instruments. Briggs testified that he glanced up, saw no lights, indicated to the captain that he had no visual contact, and continued descent by instrument. Marsh said that he then checked the flight instruments, ascertained that readings were as they should be, including an air speed of 140 miles per hour, and then looked again at the runway lights. This was at an altitude of 420 feet. Again he checked the

readings of flight instruments and found them satisfactory, including an air speed of 140 miles per hour. At 300 feet he once more checked the runway lights and noted that they appeared to rise rapidly and suddenly vanish. Almost simultaneously the aircraft was in the water.

Briggs stated that at no time during the approach did he have ground reference of any kind. He noted the altimeter indicator "going through" 300 feet and stated that almost immediately the aircraft struck. Neither pilot remembers any instrument reading below 300 feet. Both pilots testified, and the consensus of passengers' testimony concurs, that deceleration after the aircraft had contacted the water was uniform and although strong, was not violent.

Throughout the flight from Boston to the time of the crash there had been no malfunctioning of the aircraft or any of its components, including both powerplants.

Salvage operations were started as soon as feasible. They resulted in recovery of practically all of the aircraft, with the exception of both propellers. Divers furnished by the U. S. Navy were unable to recover these propellers, as the bottom of the bay in that area was littered with debris, including old pilings in exceptionally soft, deep silt.

The possibility of a malfunction causing propeller reversal during the approach was considered. As neither propeller was recovered, it is impossible to preclude absolutely this possibility. However, the testimony of both pilots makes this extremely remote.

Examination of the recovered wreckage failed to reveal any indication of a structural failure or defect of the aircraft proper. Examination of the engines likewise failed to reveal any suggestion that they had not been operating properly at the time of impact. The landing gear was extended and locked at the time of impact and the wing flaps were extended to the approach position of $21\frac{1}{2}$ degrees. The empennage was practically intact and all empennage controls were fully operable. All trim tabs were likewise found intact and operable. All three of these trim tabs were deflected, as shown by their indicators, amounts well within what would be expected for a normal approach.

Although the underside of the fuselage was generally collapsed, the forward portion of this fuselage underside was not comparably damaged, indicating that contact with the water was made in a tail low attitude. The cabin floor buckled upward under hydraulic loads.

Both altimeters were found set at 30.00, the setting last given the flight. One altimeter had been damaged to such an extent that it could not be functionally tested; the other was tested and proved to be within normal tolerances.

The matter of possible altimeter error was thoroughly explored as a result of this accident. It was developed that there are eight possible ways in which an altimeter can be in error. It is also shown that even if, by the most remote possibility, all eight of these errors had happened simultaneously, and further, if they had been additive, also a highly remote possibility, the total amount of the altimeter's erroneous indication would be but in the order of 110 feet.

Both air speed indicators were found to be within allowable tolerances when functionally tested. Both the captain and the copilot

testified that the powerplant settings during the approach were about 2300 rpm and 21 inches of manifold pressure, and that the settings were not changed after crossing the LaGuardia range. Both also stated that air speed and rate of descent were approximately 140 mph and 600 feet per minute, respectively, during the entire approach. However, the captain testified that the aircraft's nose may have been slightly up just before contacting the water.

Weather reports available to Flight 801 before departure from Boston showed ceiling mostly around 3,000 feet with other layers above, light rain and fog at many points, surface winds mostly southerly and very light, and winds at the cruising level southwesterly about 20 to 30 knots. The 0725 weather at LaGuardia was ceiling estimated 3,000, broken, overcast 6,000, visibility 2, light rain and smoke, temperature 43, dewpoint 41, wind SE 5, altimeter setting 29.99. The 0725 weather at Idlewild, the alternate, was scattered clouds at 3,600, overcast with a measured ceiling of 5,500, visibility 4, light rain and fog, temperature 41, dewpoint 39, wind NW 5 and altimeter setting 30.00.

Forecasts for the route, available before departure, indicated overcast with bases ranging from 2,500 to 5,000 feet, gradually lowering in the New York area to 1,500 to 3,000 feet, with tops of clouds ranging from about 7,000 in the New York area to 18,000 at Boston. Visibility was forecast to be generally 2 miles or better with light rain drizzle.

The terminal forecast for LaGuardia was: from 0800 to 1400, ceiling 2500, overcast, visibility 2, smoke, occasional light rain. The forecast for Idlewild was identical to that for LaGuardia with the exception

that visibility was expected to be three miles.

During the descent and approach to LaGuardia an observation was taken that showed the first definite deterioration of weather and was as follows: ceiling measured 1,700, broken, with an overcast at 2,800, visibility $1\frac{1}{2}$, very light rain and smoke, wind ENE 4. This was given to the flight at 0900. Following this the visibility at LaGuardia dropped to one-half mile at 0909 (six minutes after the accident), and the ceiling was reported to be 600 feet at 0910 because a low broken stratus layer moved over the field. However, at Idlewild, the alternate, the ceiling did not drop below 2,700 feet, nor visibility below one mile, up to and including 0923.

A very low layer of stratus coupled with poor surface visibility lay north of LaGuardia at the time of the approach of Flight 801 and possibly before that time. However, weather reporting stations were unaware of this condition, and its presence had not been reported by any pilot. Surface and low altitude wind at LaGuardia had been light south-easterly but shifted to ENE at 0900 and to N by 0910, causing this low stratus to drift across the airport. It is possible that a continuous watch by a weather observer might have revealed the moving in of the low clouds a little sooner than was reported, but probably not in time to have given it to the flight. This condition of surface weather at the time and place of the crash is well substantiated by passengers, both pilots, and rescue personnel. Their testimony indicates that there was a horizontal surface visibility of one-half mile or less with no wind, resulting in an unusually smooth (glassy) water surface. Pilot reports from flights operating at LaGuardia shortly after the accident confirm rapid fluctuation of weather conditions. One flight approaching the same runway

went to its minimum altitude of 500 feet and executed a missed approach because of a local and heavy rain shower. On the second approach this flight became contact at 500 feet and landed at about 0849, 14 minutes before the accident.

Flight 801 was given advisory reports by GCA during its approach. Because the direction of this approach is opposite that of the ILS approach, there is no glide slope provided. The GCA advisories for the subject approach do not include deviation from the desired altitudes, but merely deviations of azimuth at fixed distances from the runway. Such advisories are customarily not acknowledged by the incoming flight. During this approach they were received by the flight, and appropriate corrections in azimuth were made by Briggs. Indication of the aircraft vanished from the GCA scope at a point about one-half mile northeast of the end of Runway No. 22.

Analysis

It was developed during investigation that this accident was of an operational nature with no malfunctioning of the aircraft or its components, or any of the ground aids. Therefore, the following discussion will be confined principally to the operational aspects.

The operating procedures of this carrier are set forth in its Operating Manual. The manual is explicit as to minimum altitudes during approaches. The minimum altitude for a standard range approach, as was being made, at LaGuardia for Convairs of this carrier is 500 feet. There is, however, an additional 50 feet allowed as an operating tolerance to take care of certain intangible factors. When the flight

went below an altitude of 450 feet on instruments, it was in violation of the company's procedures and consequently of the CAA-approved operating specifications. It was clearly the responsibility of the pilot in command of the flight, Captain Marsh, not to allow his copilot to go below 450 feet unless the aircraft was being flown visually.

As Captain Marsh stated that he had the runway in sight from 500 feet on down, it was his duty to take over the flying of the aircraft when Briggs indicated to him at an altitude of 500 feet that he (Briggs) did not have visual contact, or to instruct him to start a missed approach. To allow the copilot to continue a descent on instruments was clearly contrary to the carrier's CAA-approved operating procedure, because the meaning of a minimum altitude is that all flight below that level shall be made exclusively by visual means.

Mention has been made earlier in this report of the possibility of altimeter error, and it was shown how relatively negligible such accumulative error could be. But the fact remains that once the aircraft was below its specified minimum, it should have been flown exclusively by visual reference to the ground, with little or no aid from altimeter readings in making the approach.

Of course there remains the possibility that the aircraft was being flown visually by Briggs. Adding weight to this possibility are a number of facts which are not to be overlooked. First is the weather. It has been shown that it was deteriorating rapidly at the time and place of the accident. There were clouds and/or fog patches below the 500-foot level and in the aircraft's path. The nature of the damage

to the aircraft, as well as Captain Marsh's testimony that the aircraft's nose may have been raised slightly just before impact, strongly suggests that the approach was being made visually by Briggs and that he inadvertently caused, or allowed, the air speed to drop markedly below the specified 140 mph approach speed, and to near the stall speed with its attendant extremely high sinking rate. This could well account for the similar testimony of both pilots in that neither remembers any instrument readings, including altimeter, during the last 300 feet of descent. The surface of the water was glassy, limiting its use as a medium of depth perception.^{2/}

An important psychological factor enters into making an approach under the subject conditions. It concerns the erroneous impression of altitude and is described in "The Sensory Illusions of Pilots," by P. P. Cocquyt, chief pilot of Sabena, the Belgian airline, published by the Flight Safety Foundation, Inc. He writes, ". . . The illusion of flying horizontally with respect to a landmark when flying more nose up than imagined is dangerous because the pilot believes himself to be higher than he really is. The angle at which a pilot observes a point of light on the horizon depends on his altitude and his distance from the point. Evaluation of that angle is not a matter of mathematics but is one of feeling (purely subjective).

^{2/} Seaplane and flying boat pilots are acutely aware of the dangers attendant to landing on a "glass" surface.

This illusion may have serious consequences. In fact, if the pilot without realizing it changes the angle of his airplane with respect to its initial position by as little as one degree, this error translates into differences in altitude of:

- 17.5 meters for a landmark 1 kilometer away
- 35.0 meters for a landmark 2 kilometers away
- 87.5 meters for a landmark 5 kilometers away
- 175.0 meters for a landmark 10 kilometers away ^{3/}

The illusion cited above must certainly be a cause of many aircraft accidents occurring just before the airplane reaches the airfield, especially when no adequate landmark can be found in the approaches (for example: an airdrome located on the edge of the ocean)...."

In the above passage the author refers to a night approach toward a lighted airport, and particularly when this approach is over water. However, this particular accident happened under quite similar conditions, despite its being daylight. The runway lights were on and the last 3.2 miles of approach were over water. Inasmuch as the surface visibility at the airport was being reported as only $\frac{1}{2}$ miles and was much less at the crash site, the flight had no adequate ground reference, merely lights on the approach end of the runway. Riker's Island was to the right and ahead of the aircraft at its point of contact with the water and only approximately one-fourth mile away. Captain Marsh, on the right side, stated that he saw the near end of this island, but at best he could have seen it but vaguely and fleetingly; otherwise, he could have used it as a visual altitude reference.

The lights on the approach end of the runway, as reportedly seen by the captain, can well be considered as a single visual reference point because of their apparent close spacing from an aircraft an appreciable distance away.

^{3/} In English units, these figures correspond to approximately 92 feet at one mile, 184 feet at two miles, etc.

Thus, we have a set of conditions closely simulating those of the above-quoted passage. The captain stated that he could not dismiss the possibility of having had an erroneous illusion of altitude and distance due to weather.

Strong, but not violent, deceleration as described by aircraft occupants seems to be convincing evidence that contact with the water was at a speed far less than the recommended approach speed of about 140 miles per hour. In fact, it seems unlikely that a modern transport with landing gear extended and carrying 39 passengers could be ditched at 140 miles per hour during a no-wind condition without widespread serious injuries to its occupants.

If we pursue further the hypothesis that Briggs was attempting to make the approach visually, it appears probable that he allowed the aircraft's speed to fall constantly as he eased the control wheel backward. This hypothesis is further strengthened by the nature of the aircraft's damage. The central and rear portions of the underside of the fuselage were completely collapsed, whereas the forward portion of the underside of the fuselage had comparatively little damage. This indicates that the aircraft went into the water in approximately the same attitude as does a flying boat under a practically full stall, tail-first touchdown.

Inasmuch as there was no malfunctioning of any kind, it appears that this accident was the result of the series of events as described in the above hypothesis. The prescribed let-down procedures during a standard range approach are rigid. They include control of air speed by appropriate power settings and degree of flap extension. If the air speed had been maintained, the aircraft could have descended to the level of the runway only on the runway and near its approach end, assuming no change in power

settings, as appears to have been the case. It must, therefore, be concluded that an air speed of about 140 miles per hour was not maintained but was allowed to decrease to such an extent that the aircraft settled rapidly to the surface.^{4/}

As previously stated, the flight departed from Boston at 0745 and there was attached to the clearance the 0725 weather report for LaGuardia, which was ceiling estimated 3,000 broken, overcast 6,000, visibility 2, light rain and smoke. The weather at LaGuardia continued to deteriorate during the next two hours. The pilot did not request nor was he transmitted directly additional LaGuardia terminal weather while he was en route. The terminal weather at LaGuardia for 0825 was available to the flight by means of the 0845 broadcast. That report was ceiling estimated 3,000 overcast, visibility $1\frac{1}{2}$, moderate rain and smoke. After the flight had been cleared for approach to Runway 22 by LaGuardia Approach Control, the pilot received the 0900 LaGuardia weather, which was ceiling 1,700 and visibility $1\frac{1}{2}$ miles. The aircraft struck the water in Flushing Bay at 0903. The weather reports show that by 0910 the visibility at LaGuardia had dropped to $1/2$ mile and the ceiling was reported to be 600 feet.

It was self evident to the pilot that the weather was deteriorating. However, there was no reason for him to believe that the ceiling was close to minimum until he was on final straight-in approach. He could, of course, have asked for and received the use of the IIS runway. As this report explains, there was no reason for any ground personnel to believe this necessary.

^{4/} On July 3, 1952, the CAA filed complaints against both pilots, charging violation of CAR Sec. 60.12 (careless and reckless operation) and violation of CAR Sec. 61.272 (failure to comply with CAA-approved landing procedures).

The Civil Aeronautics Board has initiated action with the proper Government agencies, i.e., the Weather Bureau and the Civil Aeronautics Administration, both of the Department of Commerce, and the Air Navigation Development Board, to improve and speed up the reporting of weather conditions on approach paths and at terminals when those conditions are close to marginal and deteriorating as was the case in this accident.

Findings

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

1. The carrier, the aircraft, and the crew were properly certificated.
2. The flight was properly dispatched and cleared according to Instrument Flight Rules.
3. Until final approach at the destination, the flight was routine in all respects.
4. The flight was given, and acknowledged, the 0900 LaGuardia weather and was cleared to land on Runway No. 22.
5. The weather data included a ceiling of 1,700 feet and visibility of $1\frac{1}{2}$ miles.
6. Authorized minimum ceiling and visibility for the subject approach were 500 feet and one mile, respectively.
7. Instrument weather was encountered during the approach.
8. The approach was continued visually, despite the instrument weather.
9. Air speed was decreased and the aircraft settled rapidly to the water at 0903.
10. There was no malfunctioning or failure of the aircraft, or any of its components.

Probable Cause

The Board determines that the probable cause of this accident was the failure of the captain in command to monitor the copilot's approach and take corrective action when the aircraft first went appreciably below a normal approach path.

BY THE CIVIL AERONAUTICS BOARD:

/s/ OSWALD RYAN

/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 New York office of the Civil Aeronautics Board was notified of this accident by the Civil Aeronautics Administration a few minutes after occurrence. 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 ordered by the Board and was held at the Hotel Lexington, New York City, on February 26 and 27, 1952.

Air Carrier

Northeast Airlines, Inc., is a scheduled air carrier, incorporated in the Commonwealth of Massachusetts, with its principal business office at Boston, Massachusetts. It operates under a currently effective certificate of public convenience and necessity issued by the Civil Aeronautics Board, and an air carrier operating certificate issued by the Civil Aeronautics Administration. These certificates authorize the company to transport by air persons and property over numerous routes within the continental limits of the United States, including that between Boston and New York.

Flight Personnel

Captain A. V. R. Marsh, age 44, held a currently effective airline transport certificate with an appropriate rating for the subject aircraft. He had been employed continuously by Northeast Airlines since 1938. His total piloting time was 13,849 hours, of which 2,382 hours had been in Convairs, and he was a company captain and check pilot.

First Officer Austin E. Briggs, age 35, held a currently effective airline transport rating with appropriate rating for the subject aircraft. He had been employed by the company as a pilot since 1942. His total piloting time was about 5,100 hours, of which about 700 had been as copilot on Convairs.

The stewardess was Carolyn M. Hull, who had been with the company for about one year. She had successfully completed the company's stewardess training course in emergency procedures.

The Aircraft

N 91238 was a Convair CV-240, manufactured by the Consolidated Vultee Aircraft Corporation in 1949. Its total operational time was 5,962 hours. The engines were Pratt & Whitney R-2800-CA-18, and the propellers Curtiss C6325-740-602.