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AIRCRAFT ACCIDENT REPORT

[redacted]

DELTA AIR LINES, INC.

DC–8, N802E

Kenner, Louisiana

March 30, 1967

NATIONAL TRANSPORTATION SAFETY BOARD
DEPARTMENT OF TRANSPORTATION
WASHINGTON D.C. 20591

SA–397

File 1–0003

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TABLE OF CONTENTS

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SYNOPSIS

Delta Air Lines, Inc., DC-8, N802E, operating as Flight 9877, crashed during a landing approach to Runway 1 at New Orleans International Airport, Kenner, Louisiana, on March 30, 1967. Five crewmembers and an FAA observer were fatally injured. This was a training flight with no passengers aboard; however, impact occurred in a residential area and 13 persons on the ground were also killed. The aircraft, several homes and part of a motel complex were destroyed.

The flight had just taken off on Runway 28 at 0043 c.s.t., and was in the process of executing a simulated two-engine out landing when the crash occurred. The weather at the time was clear skies, visibility five miles, and the wind from 110 degrees at three knots.

The Board determines the probable cause of this accident was the improper supervision by the instructor, and the improper use of flight and power controls by both the instructor and the captain-trainee during a simulated two-engine out landing approach, which resulted in a loss of control.

1.1 History of the Flight

Delta Air Lines, Inc., DC-8, N802E, was scheduled as Flight 9877, to provide crew training for a captain-trainee and a flight engineer-trainee. In addition the flight engineer-instructor was being given a routine proficiency check. At 2314 [1/] a weather briefing was given to the instructor pilot by a Weather Bureau (WB) forecaster at the New Orleans International Airport. He indicated, ". . . the only significant weather was a restriction in visibility which was expected to reduce to about two (2) miles in fog and smoke near 0600 . . ." The flight departed the ramp at 0040 with the captain-trainee in the left seat and the check captain in the right seat. A flight plan was neither filed nor required. At 0043 the crew advised the tower they were ready for takeoff and would ". . . like to circle and land on one (Runway 1)." The tower controller then cleared them as requested. The aircraft was observed to make what appeared to be a normal takeoff and departure. At 0047 the crew reported on base leg for Runway 1, and the controller cleared the flight to land. A subsequent discussion revealed that they would execute a full stop landing and then takeoff on Runway 19.

The tower controller stated that he observed Flight 9877 in a shallow left turn on what appeared to be a normal final approach. He stated that, "the degree of bank increased. The descent and turn continued. The nose of the aircraft was pointed approximately 320 degrees and the bank approximately 60 degrees or greater when the aircraft hit the power lines."

1/ All times herein are central standard, based on the 24-hour clock.

Witnesses on the ground generally corroborate this account. In addition, those directly under the path of the aircraft described a sudden increase in engine sound which they associated with "full power." One witness who was approaching the airport from the northwest in a light twin-engine aircraft reported that flight conditions were smooth during his descent from 7,500 feet to his approach.

A readout of the cockpit voice recorder revealed that at the time of the accident the captain-trainee was executing a simulated two-engine out approach.

The aircraft crashed approximately 2,300 feet short and 1,100 feet west of the runway threshold at 0050. 2/

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	6	0	13
Nonfatal	0	0	0
None	0	0	

1.3 Damage to Aircraft

The aircraft was destroyed by impact and fire.

1.4 Other Damage

The impact and fire damaged or destroyed three private homes, the mechanical plant and several units of a motel, a section of single railroad track, several vehicles, and powerlines in the area.

2/ The accident occurred in darkness at 29°59' North Latitude and 90°16' West Longitude.

1.5 Crew Information

Captain Maurice G. Watson, age 44, held airline transport pilot certificate No. 283056 with ratings for DC-3, DC-6/7, DC-8, DC-9, CV 240/340/440, and airplane multiengine land with commercial privileges in single-engine land and sea. He was hired on June 3, 1949, and had accumulated 19,008 total flying hours of which 58 hours were as captain and 417 hours as first officer in the DC-8. His total flight time in the last 30 days, 42 hours, was accomplished at night in the DC-8. He was a company-designated DC-9 check airman and received FAA approval of his DC-8 check airman designation on December 30, 1966. His last proficiency check was completed on December 16, 1966, and an FAA first-class medical certificate was issued on December 20, 1966, with no limitations. He had been on duty 3:20 hours in the last 24-hour period and was the instructor pilot on this flight.

Captain James W. Morton, age 48, 3/ held airline transport pilot certificate No. 186568 with ratings for DC-3, DC-6/7, DC-9, CV 240/340/440 and airplane multiengine land with commercial privileges in single-engine land. He was hired on March 13, 1951, and had accumulated 16,929 total flying hours of which 15 hours were in the DC-8. The DC-8 time was all accomplished at night, and represented his total flying time for the preceding 30-day period. His last proficiency check was conducted on September 21, 1966, in DC-9 equipment. His FAA first-class medical certificate was issued January 27, 1967, with the following restriction, "Defective near vision - holder shall possess correcting glasses while exercising privileges of his airman certificate."

3/ Although Captain Morton's airman records contained two birth dates, a review of other records revealed his birth date as April 17, 1918.

He had been on duty 3:20 hours in the last 24-hour period, and was the captain-trainee on this flight. Captain Morton's activity schedule for the two days preceding the accident were as follows:

March 28	0800-1700	Additional DC-8-51 instruction prior to completing oral examination.
	1800-1900	Oral examination completed
	1900-2300	Rest
March 29	2300-0150	Flight training
	0200-0800	Rest
	0800-1700	DC-8-61 ground school
	1700-2200	Rest
	2300-Accident	Flight training

Captain William T. Jeter, Jr., age 33, held airline transport pilot certificate No. 1339294 with ratings for DC-6/7, DC-9, CV 240/340/440 and airplane multiengine land with commercial privileges in single-engine land, and rotorcraft helicopter. He also held flight engineer certificate No. 1459248 with ratings for reciprocating engine and turbojet powered equipment. He was hired October 9, 1959, and had accumulated a total flight engineer time of 2,715 hours, of which 529 hours were in DC-8 equipment. His last FAA first-class medical certificate was issued February 24, 1967, with no limitations. He was a company-designated flight engineer check airman and FAA-approved in both piston and turbine equipment. He had been on duty 2:00 hours of the last 24-hour period, and was a flight engineer check airman on this flight.

Flight Engineer David E. Posey, age 25, held flight engineer certificate No. 1622527 with ratings for reciprocating engine powered and turbojet powered equipment. He also held commercial pilot certificate No. 1537716 with airplane single and multiengine land and instrument ratings. He was hired on November 16, 1964, and had accumulated a total flight engineer time of 1,371 hours, of which 667 hours were in the DC-8. His last FAA second-class medical certificate was issued on October 11, 1966, with no limitations. He was a company-designated flight engineer check airman and FAA-approved for both piston and turbine equipment. He had been on duty 3:20 hours of the last 24-hour period, and was the flight engineer-instructor on this flight.

Flight Engineer George Piazza, age 30, held flight engineer certificate No. 1648701 with a rating for reciprocating engine powered equipment. He also held commercial pilot certificate No. 1254857 with airplane single-engine land and instrument ratings. He was hired on May 3, 1965, and had accumulated a total flight engineer time of 802 hours, of which six hours were in the DC-8. His FAA first-class medical certificate was issued on April 26, 1966, with no limitations. He had been on duty 3:20 hours in the preceding 24-hour period, and was the flight engineer-trainee on this flight.

1.6 Aircraft Information

N802E, a DC-8-51, S/N 45409 was manufactured by the Douglas Aircraft Company, Inc., and purchased by Delta Air Lines, Inc., on September 14, 1959. It had accumulated a total time of 23,391 hours at the time of the accident. Records indicated that the aircraft had been maintained in accordance with FAA requirements.

The aircraft was equipped with four Pratt and Whitney JT3D-1 engines installed as follows:

Position	Serial No.	Time Since Overhaul	Total Time
1	644003	4537.7	11,089.1
2	644302	4476.6	8,048.4
3	644000	3517.2	10,081.1
4	644069	4152.5	10,400.3

The aircraft was serviced with type A kerosene and at takeoff weighed 179,670 pounds, which was well below the maximum allowable takeoff weight of 275,500 pounds and the maximum design landing weight of 199,500 pounds. The computed center of gravity (c.g.) was 25.0 percent, which was within the allowable range of 16.5 through 32 percent.

1.7 Meteorological Information

The WB terminal forecast for New Orleans International Airport for a 12-hour period beginning at 2300 (March 29) was in part as follows:

2300-0200 Clear, 6 miles, smoke
0200-0600 Clear, 4 miles, smoke

The 0052 special surface observation was clear, five miles visibility, smoke, haze, 58 degrees, dewpoint 56 degrees, wind from 110 degrees at three knots, 30.01.

1.8 Aids to Navigation

All navigational aids in the area were checked subsequent to the accident and found to be operating within acceptable tolerances. Runway 1 does not have an instrument landing system.

1.9 Communications

There were no reported problems with communications. All transmissions from Flight 9877 were made by the instructor.

1.10 Aerodrome and Ground Facilities

The New Orleans International Airport is located in Kenner, Louisiana, approximately ten miles west of New Orleans, in flat terrain. Runway 1 is 7,000 feet long and 150 feet wide. It has medium intensity runway lights and runway end identifier lights.

1.11 Flight Recorders

The aircraft was equipped with a flight data recorder and a cockpit voice recorder; both were recovered in satisfactory condition.

The flight data recorder was a Lockheed Aircraft Service Model 109C, S/N 318. The recorder sustained no impact or fire damage; however, the recording medium sustained considerable damage caused mostly by styli and cassette movement during the impact period. The medium was subsequently straightened without difficulty and the flight record was not affected. Styli operation was normal and good time correlation was established between the parameters. The altitude and airspeed parameters were considered aberrant beyond 5:35 minutes after liftoff due to abnormal effects of the aircraft attitude on the pressure-sensing devices.

The aircraft was also equipped with a Fairchild A100, S/N 972 cockpit voice recorder. Although the front plate of the recorder was missing and the unit sustained extensive fire damage, the recordings on the tape were satisfactory.

1.12 Wreckage

Initial impact occurred in a large tree about 40 feet above the ground. After contacting two more trees, the aircraft then slashed through the corner

of a house, struck a panel truck, and made initial ground contact at the far edge of the street in front of a house. The descent angle was 14 degrees and the angle of bank was 50-60 degrees. The aircraft continued descending, totally destroying a second house, and creating a 30-foot crater up to three feet deep along a general heading of 305 degrees. A third house adjacent to the ground swath was severely damaged by fire. The aircraft continued shedding parts as it skidded along the ground, over a railroad embankment, and finally coming to rest against the buildings of a motel complex approximately 700 feet from the first tree.

The most extensive breakup of the aircraft structure occurred on the left side and forward fuselage areas. The fuselage center and tail sections, the right wing, and the empennage were all relatively intact in the area of the motel. Nearly all of the aircraft and motel structure in this area were gutted and fire damaged except for some lightly sooted pieces of aircraft which were buried under debris. There was no indication of inflight fire. The extensive breakup and subsequent fire damage precluded a determination of the position of the landing gear, spoilers, or leading edge slots. Similarly, the integrity of the flight control system could not be established. Three flap actuators, each positioned for 50 degrees (landing flaps), were recovered. Two actuators from the left wing and one from the right wing were not recovered.

Metal fusion on the nozzle guide vanes of all four powerplants confirmed engine operation at impact. The compressor bleed valves from engines Nos. 1 and 2 were closed, indicating compressor speed in excess of 74.4 percent.

The valve from No. 3 was separated at the mount flange, and No. 4 was not recovered. EPR and fuel flow gauges for the engines were as follows:

Engine	EPR	Fuel Flow - pounds/hr.
1	1.70	10,000
2	1.64	10,750
3	1.74	9,800
4	1.81	10,000

The horizontal stabilizer was set at 2.5 degrees aircraft nose up. The pitch trim compensator was retracted, and the cockpit control levers for aileron and rudder hydraulic power were "ON." The aileron power units and control valves were positioned for left aileron down and right aileron up. The rudder actuator position was approximately one-half full-right rudder when it was damaged. When the damage to the rudder tab linkage was aligned the rudder tab was in the faired position.

1.13 Fire

Most of the wreckage exhibited some evidence of fire, and large portions, especially those near the motel, were almost completely consumed. In addition, the motel mechanical plant and many units, two homes and several vehicles were destroyed by fire.

1.14 Survival Aspects

This was a nonsurvivable accident.

1.15 Tests and Research

None.

1.16 Other

Delta Air Lines DC-8 Operating Manual describes the two-engine approach and landing as follows:

> Fly a normal traffic pattern for an approach and landing with two engines out on one side. Plan the pattern to avoid banking over 30°. When maneuvering the aircraft in the clean configuration, 200 knots is the recommended airspeed since rudder travel and rudder boost pressure is restricted when flaps are extended less than 10°. On the downwind leg, extend flaps to 25° and maintain 165 knots. This airspeed provides a safe margin above two-engine V_{mc} (148-151K) and maneuvering flaps of 25° provides full rudder capabilities. The drag of the landing gear is relatively low and gear may be extended on the base leg and the airspeed be allowed to decrease to 155 knots minimum on final approach. Maintain the final approach airspeed of 155 knots to the point where additional flaps are required and landing is assured without the possibility of undershooting the runway. The final descent angle should be normal or slightly steeper than a normal approach.
>
> NOTE: Avoid a flat, high thrust, high flap-drag approach. Before achieving the landing configuration, exercise precise planning and control to prevent placing the aircraft in a condition from which a go-around is impossible (that is, an

airspeed too low to permit applying take-off thrust on the good engines without loss of directional control). Make the decision to continue for a landing at sufficient altitude and distance from the runway to allow deceleration to the threshold speed plus 5 to 10 knots. Return rudder trim to neutral position as thrust is reduced.

1. Establish 200 knots for maneuvering in the clean configuration and entry into a normal traffic pattern.
2. On the downwind leg, extend flaps to 25°, maintain altitude and 165 knots.
3. Extend landing gear on base, or on final, as descent is begun. Maintain final approach airspeed of 155 knots to the position during the approach, where landing flaps will be extended and a glide angle established that ideally, allows gradual reduction of thrust so as to cross the threshold at slightly above normal flare speed. However, if it appears that speed is bleeding off too rapidly, add thrust in time to prevent speed dropping below $1.3V_{so}$ + 5 knots prior to threshold. Rudder trim should be neutralized, by pre-arrangement, as thrust is reduced in flare.
4. Do not make a protracted hold off. Establish runway contact as soon as practicable.

The company does not have a specific checklist for a two-engine out landing.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The aircraft had been maintained in accordance with FAA regulations, and the gross weight and c.g. were within allowable limits. The crew was properly certificated and was performing a prebriefed simulated two-engine out landing approach during an authorized training flight.

The initial simulated engine failure occurred at 0044 as the aircraft reached V_1 (critical-engine-failure speed). One minute later, during the climbout, a second engine failure was simulated. The aircraft was then at approximately 1,200 feet and 200 knots, with Nos. 1 and 2 engines at idle. At 0046, the captain-trainee was informed that he had lost rudder power. According to all indications this emergency was simulated by illuminating the warning light rather than by deactivating the system.

As the flight turned left to an easterly heading, the altitude was decreasing to approximately 900 feet. At about this time, 0048, the flaps were lowered to 25 degrees and altitude increased to 1,100 feet as the airspeed decreased to 180 knots. During this transitional period the instructor began to prompt the captain-trainee on basic airmanship e.g. "don't . . . get below a hundred and sixty . . . Ball in the middle . . . Whatever it takes, put 'er in there now. . . ."

At 0049:20 as the landing checklist was being accomplished, landing flaps were lowered by the instructor, without command from the captain-trainee. Shortly thereafter, the aircraft descended through 650 feet at 165 knots, approximately 2.5 miles from the runway. From this point a 2.5

degree glide path, similar to an ILS approach, would result in a normal touchdown on the runway. The optimism of unidentified crewmembers was reflected in such comments as: "Okay, Bud, looks good", "How 'bout that", and "Now we're straightened out." Unfortunately the actual descent angle at this point was three degrees. The captain-trainee did not allow for the increased drag created by the landing flaps and failed to add power in order to maintain a proper glide angle and rate of descent consistent with the airspeed. The instructor provided no corrective action, allowing the captain-trainee to decrease the descent by increasing the aircraft nose attitude rather than with power. From this point on the need for corrective action was critical and increased markedly as the landing approach continued. As the airspeed continued decreasing to approximately 136 knots, the need for power was recognized, and power was applied to engines Nos. 3 and 4. A few seconds later a marked divergence of aircraft heading to the left, coincident with a sharp reduction in indicated airspeed and rate of descent, signaled the first stages of control loss. The estimated aircraft sideslip angle was increasing rapidly from about 13 to 18.5 degrees, and the crew's alarm was reflected in their exclamations beginning at 0050:05. Eight seconds later the cockpit voice recording ended.

It is obvious from the total evidence that the causal area lies in the human element. The Board believes that this accident involved both errors in judgment by a captain-trainee and inadequate supervision and exercise of command on the part of the instructor.

Except for DC-8 qualification, the captain-trainee and instructor were equals in pilot status; [4/] they were engaged in their fifth night training flight together; and the estimation of each other's ability was undoubtedly well established. Consequently, the instructor-student relationship was informal. The cockpit voice recorder revealed a relaxed atmosphere. The tones of the few suggestions given by the instructor were in a mild prompting manner. There appeared to be complete confidence in the student's ability to overcome any problem, including the drastically reduced airspeed. There was no apprehension manifest until the captain-trainee himself recognized the loss of control, at which point the accident was inevitable. In addition to the instructor's confidence in the ability of the captain-trainee, it is possible that because of the near equal status of the two pilots, the instructor was more hesitant to take control of the aircraft. Also, under stricter instructor-student relationship, the instructor probably would have taken control earlier in the sequence.

Another factor which probably affected the performance of the captain-trainee is fatigue. In the two days preceding the accident flight he was engaged in intensive ground school and flight training. Presumably because of this workload, part of which was voluntary, and the small rest periods available, he stayed at the motel across the street from the airport during this time. The captain-trainee had a four-hour rest period from 1900-2300 on March 28, a six-hour rest period from 0200-0800 and a five-hour rest period from 1700-2200 on March 29. Considering that these periods incorporated

4/ See 1.5 Crew Information, p.4.

travel, meals, bathing, dressing, and other personal activities in addition to study for the training flights it is obvious that his actual rest was minimal. Although fatigue and its effects are subjective in nature and difficult to assess, the disturbed work-rest cycle superimposed on the natural stresses of the training environment was undoubtedly reflected in the performance of the captain-trainee.

2.2 Conclusions

(a) Findings

1. The aircraft was airworthy and the crew properly certificated.
2. There was no failure of any aircraft system, powerplant or component.
3. The captain-trainee was performing a simulated two-engine out landing maneuver.
4. The captain-trainee's performance was affected by some degree of fatigue.
5. The instructor lowered full landing flaps, on his own initiative, too early in the approach.
6. The instructor failed to assume control of the aircraft despite the rapidly deteriorating circumstances.
7. The instructor's actions were affected by his confidence in in the captain-trainee's ability.

(b) Probable Cause

The Board determines the probable cause of this accident was the improper supervision by the instructor, and the improper use of flight and power controls by both the instructor and the captain-trainee during a simulated two-engine out landing approach, which resulted in a loss of control.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

Joseph J. O'Connell, Jr.

Oscar M. Laurel

John H. Reed

Louis M. Thayer

Francis H. McAdams

ATTACHMENT I

COCKPIT VOICE RECORDING

The following is a partial transcript of the conversation in the cockpit of Flight 9877:

0048:21	Instructor:	Don't let that thing get below a hundred and sixty (knots).
:26	Instructor:	Ball in the middle, Jim.
	" :	Whatever it takes, put'er in there now
0048:50	Trainee :	Get my landing gear for me
:58	(Sound of landing gear in transit-Landing checklist begins)	
0049:20	F/E :	Wing flaps
	Instructor:	Landing flaps
	(Landing checklist continued)	
:22	Instructor:	Before landing complete
:31	" :	One twenty-nine is approach, twenty-four threshold
	? :	Okay, Bud, looks good (In background)
	? :	How 'bout that
	? :	Now we're straightened out
:45	Trainee :	Call my airspeed for me
:47	Instructor:	One forty
:51	(Sound of engines beginning slight spoolup)	
:52	Instructor:	One thirty-five
:58	" :	See you're letting her get - - - 'ut the rudder in there --- you're getting your speed down now, you're not going to be able to get it
	Trainee :	Uh uh
0050:05	" :	CAN'T HOLD IT BUD
	Instructor:	Naw, DON'T, let it up, let it up, let'er up, let'er up, let it up!
0050:13	(End of recording)	