File No. 1-0002

AIRCRAFT ACCIDENT REPORT

EASTERN AIR LINES INC.
DC-9-31, N8961E

Fort Lauderdale, Florida

May 18, 1972

Adopted: December 13, 1972

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591
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16. Abstract

Eastern Air Lines, Inc., Flight 346 was involved in a landing accident on May 18, 1972, at approximately 1521 eastern daylight time, at the Fort Lauderdale-Hollywood International Airport, Fort Lauderdale, Florida.

The accident occurred following a straight-in localizer approach to Runway 9L when the aircraft touched down hard on the runway, resulting in the failure of the main landing gear and the separation of the tail section from the aircraft. The aircraft was destroyed by subsequent ground fire.

At the time of the accident, heavy rainshowers, associated with thunderstorm activity, were occurring at the airport.

There were six passengers and a crew of four aboard the aircraft, and injuries were sustained by the captain, one stewardess, and one passenger.

The National Transportation Safety Board determines that the probable cause of this accident was the decision of the pilot to initiate and continue an instrument approach under weather conditions which precluded adequate visual reference and the faulty techniques used by the pilot during the landing phase of that approach.

The Board also finds that the flightcrew's nonadherence to prescribed operational practices and procedures compromised the safe operation of the flight.

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Adopted: December 13, 1972

EASTERN AIR LINES, INC.,
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FORT LAUDERDALE, FLORIDA
MAY 18, 1972

SYNOPSIS

Eastern Air Lines, Inc., Flight **346** was involved in a landing accident on May 18, 1972, at approximately-1521 eastern daylight time, at the Fort Lauderdale-Hollywood International Airport, Fort Lauderdale, Florida.

The accident occurred following a straight-in localizer approach to Runway 9L when the aircraft touched down hard on the runway, resulting in the failure of the main gear and the separation of the tail section from the aircraft. The aircraft was destroyed by subsequent ground fire.

At the time of the accident, heavy rainshowers, associated with thunderstorm activity, were occurring at the airport. The Fort Lauderdale weather information, transmitted to the flight prior to commencement of the approach, was: "estimated seven hundred overcast, one-half mile, thunderstorm, heavy rainshower."

There were *six* passengers and a crew of four aboard the aircraft, and injuries were sustained by the captain, one stewardess, and one passenger.

The National Transportation Safety Board determines that the probable cause of this accident was the decision of the pilot to initiate and continue an instrument approach under weather conditions which precluded adequate visual reference and the faulty techniques used by the pilot during the landing phase of that approach.

The Safety Board also finds that the flightcrew's nonadherence to prescribed operational practices and procedures compromised the safe operation of the flight.

The Safety Board recommended that the Federal Aviation Administration:

1. Reemphasize **to** flight crewmembers the necessity for total crew coordination and adherence to approved procedures.
2. Insure that all flight crewmembers are currently apprised of the contents of **Air** Carrier Operations Bulletin 71-9, emphasizing that a "nonprecision" approach requires **as** much, if not more, crew coordination than a "precision" approach because of the lack of precise guidance **from** electronic navigational aids outside the aircraft.

1. INVESTIGATION

1.1 History of the Flight

Eastern Air Lines, Inc., Flight 346 (EAL 346) of May 18, 1972, a DC-9-31, N8961E, was a scheduled passenger flight from Miami, Florida, to Cleveland, Ohio, with an intermediate stop at Fort Lauderdale, Florida.

The flight departed Miami International Airport at 1511[1] on an instrument flight rules (IFR) clearance with *six* passengers and four crewmembers and was cleared direct to the Fort Lauderdale VOR via radar vectors.

After takeoff, EAL 346 contacted Miami departure control and was cleared to climb to and maintain 3,000 feet via radar vector toward Fort Lauderdale. Shortly thereafter, control of the flight was transferred to Miami Approach Control, which also served as the approach control facility for Fort Lauderdale-Hollywood International Airport.

The flight was cleared by the approach controller to fly a heading of 300" for radar vectors to the instrument-landing-system (ILS) approach course for Runway 9L and was advised to follow a Northeast DG9 (NE-57), also inbound to Fort Lauderdale-Hollywood International Airport.

At approximately 1515, EAL 346 was cleared to descend to and maintain 2,000 feet and was advised of the current Fort Lauderdale weather, as follows: ". . . estimated seven hundred overcast one-half mile thunderstorm, heavy rainshower." The flight acknowledged the advisory by responding, "three forty-six."

Under receipt of this same advisory, NE-57 stated that they needed three quarters of a mile visibility to conduct the approach; whereupon, they were cleared to climb to 3,000 feet and were told to execute a series of delaying turns until the weather situation improved.[2]

At 1515:32, EAL 346 and NE-57 were advised by Miami Approach Control that the glide-slope portion of the ILS was out of service. The approach controller queried EAL 346 as to the EAL weather minima required in order to execute the approach with the glide-slope inoperative and whether they were going to attempt this approach. EAL 346 replied, ". . . if we got seven hundred is enough." The flight was cleared to descend to 1,700 feet and was provided with radar vectors to the final approach course.

Upon receipt of the inoperative glide-slope information, the Northeast flight advised approach control that they needed 1 mile visibility to make a localizer approach and they would continue holding at 3,000 feet.

At 1516:43, EAL 346 was vectored to a heading of 070°, was cleared for a 9L straight-in localizer approach, and was again advised that the glide slope was inoperative. Following the acknowledgment of this clearance, the flight was instructed to contact the Fort Lauderdale Tower.

At 1518:25, EAL 346 contacted the tower and was advised, "Eastern three forty-six Fort Lauderdale Tower report the marker inbound for nine left wind one eight zero degrees ten."

At 1518:34, the tower controller advised, 'We're estimated seven hundred overcast, half-mile, thunderstorm, heavy rainshower over the airport." Ten seconds later, the tower controller reported, "Eastern three forty-six our glide-slope appears to be back in." However, almost immediately thereafter, the flight was advised, "it just went back out again."

EAL 346 did not respond to these transmissions, and no further radio communications were received from the flight.

The accident occurred at approximately 1521. Controllers in the tower cab first obser-

[1] All times used herein are eastern daylight, based on the 24-hour clock.

[2] The published visibility minima for the ILS approach to Runway 9L at Fort Lauderdale-Hollywood Airport was three quarters of a mile with all ILS components in operation a d 1 mile with the glide-dope out of service. (See *Section 1.8 Aids to Navigation.)*

ved EAL 346 as it was sliding down Runway 9L in the vicinity of the Runway 13 intersection. They stated that at this point, the aircraft was on fire and barely visible through the heavy rain.

A tower controller initiated the crash alarm, and the airport crash and rescue units responded immediately.

A number of eyewitnesses to the accident were located near the approach end of Runway 9L. All of them stated that a heavy rainshower was occurring in their vicinity during the time of the approach of EAL 346. They generally agreed that the aircraft appeared to be higher than normal as it came over the end of the runway and that it was descending in a nose down attitude. Most of the witnesses recalled that the aircraft appeared to flare, or level off momentarily, and then drop almost vertically onto the runway. They also stated that fire and black smoke appeared almost immediately after impact and that fire trailed from behind the aircraft as it skidded down the runway.

The captain stated that he had assumed the copilot's duties on this leg of the trip, as the first officer was flying the aircraft from the right seat. He stated that the flight was flown in visual flight conditions to the Fort Lauderdale area and that clouds associated with a thunderstorm were visible over the airport. He also said that while en route, much of his time was occupied with company communications and that, because of these duties, he did not hear the transmissions from Miami Approach Control or Fort Lauderdale Tower regarding current Fort Lauderdale weather. He stated that the first officer was in contact with air traffic control on another radio during this time, and that he relied on the first officer to pass pertinent information on to him. According to the captain, the only weather information given to him by the first officer was that the ceiling was 700 feet. He remembered that no mention was made of visibility, thunderstorms, or rainshowers.

With respect to the approach to Fort Lauderdale, the captain related:

"... when we were cleared in approach, we were cleared to 1,700 feet. We received a vector to intercept the final approach course. The airport at Fort Lauderdale was in sight at this time. This puts us very nearly over the outer marker (OM) which is just west of 'wagon wheel' (a prominent landmark approximately 2 miles east of the OM) which was in sight at the time.

"After the first officer advised me of the change in ceiling, approach control advised that the glide slope was inoperative. Checking our approach charts for Fort Lauderdale, the minimum descent altitude (MDA) now required was 460 feet. The weather now given was 700 feet overcast. At this time, I still believed we had approximately 10 miles visibility at the airport. About half way in from 'wagon wheel' the glide slope came back in and we had a centerline indication on the localizer and ON glide slope. This stayed on for a few seconds.

"On our descent we passed through one very small cloud and when east of it we were approaching our minimum descent altitude. During the approach, the fwst officer descended at the rate of 600-800 (feet per minute) with gear down and flaps at 25". The airspeed was approximately 135-140 knots. He started to level off as we approached MDA. We were still west of 1-95 (interstate highway adjacent to the end of the runway) and the runway was in sight ahead. I thought that immediate action was necessary to land within the touchdown zone, so I took over the approach putting down full flaps and closing the throttles. I could see at least a third of the runway. In our descent from here, we were descending at a greater rate than normal endeavoring to getdown visually. While descending

through an altitude of approximately 200 feet, we flew into a veritable wall of water. The first officer then said that the runway was right under **us.** I pulled back on the elevators which did not seem to respond fully to my efforts. I believe that this was a result of a severe downdraft associated with this wall of water.

"A hard touchdown resulted from this high rate of sink. After the aircraft came to rest, I determined from my first officer and senior flight attendant that all passengers had evacuated the aircraft. I then left the aircraft."

The first officer, who was flying the aircraft from the right seat, stated that the flight was in clear weather from Miami until after they had passed the outer marker location, inbound on the localizer. The aircraft's position over the OM was established by visual reference to 'wagon wheel' but was not aurally identified on navigational radios. He said that the flaps were set to 25" at the outer marker and that he commenced the descent from approximately 1,500 feet m.s.l. to **460** feet m.s.l. at this point. He also recalled that after leveling off at **460** feet, he requested that the flaps be positioned to 50" but that the captain suggested they remain in the 25" configuration. He further stated that the captain took the flight controls shortly after they had passed the 'wagon wheel' location and that he (the first officer) then assumed copiloting duties and began looking for the runway. According to the first officer, it was at about this point that the aircraft ran into the heavy rainshower. He stated that after the captain took over, he (the first officer) looked out of the cockpit, but there was no forward visibility because of the rain. He said that he did have occasional ground contact during this time.

With respect to his first observation of the runway the fiat officer testified:

"I had the box end (of the runway) in sight. This was over the tip of the nose looking down . . . . I called the runway and we started down. The captain had 50 flaps on it. As we were starting on our way down, and he is back on the power, at that point it seemed to me that the airplane's left wing dropped and the nose cocked right for a little bit, and then the captain started that back to a wings level configuration and then he eased back on the control yoke and, in my opinion, the airplane didn't respond as I expected it would. He eased back again, and the same thing happened, in my opinion, it was at that point that we hit, right after that."

Concerning the Fort Lauderdale weather information that was transmitted to the flight by both Miami Approach Control and the tower controller, the first officer stated that he could remember that they were given a 700-foot ceiling, but he could not recall hearing the 1/2-mile visibility for the airport. He also stated that he acknowledged the weather advisory from approach control by the transmission, "Three-forty-six".

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	0	0	0
Nonfatal	2	1	0
None	2	5	

All injuries were sustained as a result of the forces of the initial impact.

1.3 Damage to Aircraft

The aircraft was severely damaged by impact and destroyed in the postcrash fire.

1.4 *Other* Damage

None.

1.5 Crew Information

The captain and the first officer were certificated to serve as flight crewmembers for this flight. (For detailed information see Appendix B.)

1.6 Aircraft Information

Aircraft N8961E, a **Douglas** DC-9-31, was registered to Eastern Air Lines, Inc. The aircraft was certificated and maintained in accordance with procedures approved by the Federal Aviation Administration (FAA). (For detailed information, see Appendix C.)

1.7 Meteorological Information

The official surface weather observations taken by FAA personnel in the Fort Lauderdale control tower before and after the accident were, in part, as follows:

1449 1,800 feet scattered, estimated 10,000 broken, 25,000, broken, visibility 10 miles, wind 100° 13 knots, altimeter setting 29.75 inches, rainshowers of unknown intensity southeast-southwest.

1508 Special, estimated 700 feet overcast, visibility 1 mile, heavy rainshowers, wind 180" 18 knots, altimeter setting 29.76 inches, **rain** began 1504.

1.511 Special, estimated 700 overcast, visibility 1/2 mile, thunderstorm, heavy rainshower, wind 180° 18 knots, altimeter setting 29.76 inches, thunder began 1511, thunderstorm overhead moving northwest.

1524 Local, 700 Scattered, estimated 1,000 broken, visibility 1 mile, thunderstorm, moderate rainshowers, wind 130" 12 knots, altimeter setting 29.75, aircraft mishap.

The National Weather Service does not prepare a terminal forecast for Fort Lauderdale, The terminal forecast for Miami issued at 1340, valid for a **24-hour** period beginning at 1400, **was, in** part, as follows:

1400- 2200 Ceiling 2,000 feet broken, broken clouds variable to scattered, occasiond ceiling 800 overcast, visibility 2 miles, thunderstorm, moderate rainshowers.

The Eastern Air Lines terminal forecast for Fort Lauderdale, valid for 1210-2300, was as follows:

3,000 scattered variable to broken, scattered moderate rainshowers **or** thunderstorms with light moderate rainshowers **or** thunderstorms with light rainshowers until 2000, thereafter 1,500 overcast, light rainshowers **or** thundershowers with light rainshowers.

No formal weather briefing services were provided to the crew by the company **or** by **the** National Weather Service. However, company-provided, self-help-type briefing facilities containing the foregoing weather information were used by the captain prior to departure from Miami.

The following sections of the Federal **Aviation** Regulations deal with the subject of aircraft dispatcher responsibilities:

"§ 121.533 Responsibility for operational control: domestic **air** carriers.

(a) Each domestic *air* carrier is responsible for operational control.

(b) The pilot in command and the aircraft dispatcher are jointly responsible for the preflight planning, delay, and dispatch release of a flight in compliance with this chapter and operations specifications.

(c) The aircraft dispatcher is responsible for—

(1) Monitoring the progress of each flight;
(2) Issuing necessary information for the safety of the flight; and
(3) Cancelling or redispatching a flight if, in his opinion or the opinion of the pilot in command, the flight cannot operate or continue to operate safely as planned or released.

(d) Each pilot in command of an aircraft is, during flight time, in command of the aircraft and crew and is responsible for the safety of the passengers, crewmembers, cargo, and airplane.

(e) Each pilot in command has full control and authority in the operations of the aircraft, without limitation, over other crewmembers and their duties during flight time, whether or not he holds valid certificates authorizing him to perform the duties of those crewmembers."

"§ 121.599 Familiarity with weather conditions.

(a) Domestic and flag air carriers. No aircraft dispatcher may release a flight unless he is thoroughly familiar with reported and forecast weather conditions on the route to be flown."

"§ 121.601 Aircraft dispatcher information to pilot in command: domestic and flag air carriers.

(a) The aircraft dispatcher shall provide the pilot in command all available current reports or information on airport conditions and irregularities of navigation facilities that may affect the safety of the flight.

(b) During a flight, the aircraft dispatcher shall provide the pilot in command any additional available information of meteorological conditions and irregularities of facilities and services that may affect the safety of the flight."

There were no contacts between company dispatch and the flight, either before departure or while the flight was en route to Fort Lauderdale, concerning the Fort Lauderdale terminal weather or applicable landing minima.

1.8 Aids to Navigation

A full ILS was installed for Runway 9L at the Fort Lauderdale Airport. However, prior to and during the time of the approach of EAL 346, the glide-slope component was inoperative and was reported out-of-service.

The outer marker (OM) and middle marker (MM) for this approach are installed 5.4 miles and 0.6 miles, respectively, from the end of the runway. The procedure called for a minimum crossing altitude of 1,700 feet at the OM on the inbound localize; course of 90". With the glide slope out of service, descent to 520 feet m.s.l. was authorized between the OM and the College Intersection.[3] Descent to the Minimum Descent Altitude (MDA) of 460 feet was authorized after passing College Intersection. (See Appendix D, Jeppesen Approach Chart.)

The Jeppesen Approach Chart showed that the straight-in landing minima for Runway 9L with the glide slope inoperative were: MDA, 460 feet; visibility, 1 mile. With all components of the ILS in service, the minima listed were: decision height (DH), 257 feet; visibility, three-quarters of a mile.

Federal Aviation Regulation 121.651 (b) reads in part as follows:

". . . no pilot may execute an instrument approach procedure or land under IFR at an airport if the latest U.S. National Weather Service Report or a source approved by the Weather Bureau for that airport indicates that the visibility is less than that prescribed by the Administrator for landing at that airport."

[3] A point 3.1 miles from the runway denoted by the intersection of the 002° radial of the Plantation nondirectional beacon and the Runway 9L localizer course.

The FAA Terminal Air Traffic Control Handbook (Doc. 7110.8B) under Section 397 describes the conditions under which takeoff clearance can be denied, but contains no similar provisions for denial of approach or landing clearance. In fact, Section 432 reads as follows:

"422 - Witholding Landing Clearance

Do not withold a landing clearance indefinitely even though it appears a violation of FAR has been committed. The apparent violation might be the result of an emergency situation. In any event assist the pilot to the extent possible."

The "Note" associated with Section 1420b of Doc. 7110.8B is also of interest. It reads as follows:

"Note - Acceptance of a radar approach by a pilot does not waive the prescribed weather minima for the airport or for the particular aircraft operator concerned. The pilot is responsible for determining if the approach and landing are authorized under the existing weather minima."

As to the division of responsibility between FAA Air Traffic Control and the pilot, FAA has stated clearly that ATC can deny a takeoff clearance in below-minimum weather conditions, but cannot deny an approach or landing clearance. They contend that the pilot himself is in the best position to assess the overall approach and landing situation and make a decision accordingly. Consequently, ATC provides the pilot with pertinent approach and landing information and leaves the decision to the pilot.

1.9 Communications

There were no reported problems associated with communications between the flight and the involved air route traffic control facilities.

1.10 Aerodrome and Ground Facilities

Runway 9L at the Fort Lauderdale-Hollywood International Airport is 8,054 feet long and 150 feet wide and is concrete surfaced. The landing threshold is displaced 600 feet from the end of the runway.

The published field elevation is 10 feet above mean sea level.

1.11 Flight Recorders

N8961E was equipped with a United Control Data Division (Sundstrand) Model FA-542 flight data recorder (FDR). However, a near constant trace discontinuity (skipping) on the tape of this unit precluded a valid readout.

In addition to the FDR, the aircraft was equipped with a Fairchild Model 100 cockpit voice recorder (CVR). The CVR tape was recovered intact, and a transcript covering all pertinent communications is included in Appendix E.

1.12 Aircraft Wreckage

Examination of Runway 9L revealed that the aircraft made initial contact with the runway on the right main landing gear approximately 420 feet beyond the displaced threshold (1,020 feet from the end of the runway) and approximately 40 feet left of the runway centerline. The left main landing gear contacted the runway approximately 435 feet beyond the displaced threshold and 60 feet to the left of the runway centerline. Skid marks and gouges in the runway surface commenced at the point of initial contact and continued for a distance of approximately 2,800 feet. The aircraft departed the right side of the runway on a heading of 105" magnetic and skidded on the adjacent soft dirt surface for another 150 feet. The aircraft then pivoted around the nosewheel in a clockwise direction, coming to a stop on a heading of 300°, 3,340 feet from the

displaced threshold. (See Appendix F, wreckage Distribution Chart.)

Ground fire destroyed the outer fuselage skin from forward of the aft pressure bulkhead to near the midwing section of the aircraft.

The right main landing gear with a section of the rear spar web separated from the aircraft at impact. The left main landing gear was pushed up and to the rear but remained attached to the left wing. The nose gear was found in the down and locked position. The wing-leading edge slats were fully extended. The exact position of the trailing edge flaps could not be determined because of the damage caused by the collapse of the main landing gear. All spoiler panels were found in the retracted position. All flight control surfaces were accounted for, and no discrepancies were found in any flight control system. The stabilizer was positioned at 2.5°, aircraft nose up.

The aircraft structure, powerplants, and components revealed no evidence of any preimpact failure or malfunction.

Testing of the altimeters disclosed that they were capable of normal operation.

1.13 Fire

Shortly after touchdown, the exterior of the aircraft aft of the trailing edge of the wing was engulfed in flames emanating from the aft section of both wing-root areas.

The crash alarm was received at the Fort Lauderdale Airport Fire/Security Dispatch Center at 1521. A total of three trucks responded to the alarm. The first crash truck was at the scene, applying foam, within 40 seconds of the initial alarm, and the fire was extinguished within 2 minutes. A total of 12,000 gallons of 3 percent protein foam was used in extinguishing the fire.

1.14 Survival Aspects

This was a survivable accident. All crewmembers and passengers exited the aircraft through the forward main entry door. The aircraft had come to rest on its belly, and the height from the floor level to the ground was approximately 3 feet. The stewardess experienced difficulty in opening the forward entry door and was subsequently assisted by the fwst officer and the passengers. The opening difficulty occurred when the fiberglass slide cover caught in the doorway. Three of the passengers jumped from the doorway prior to escape-chute deployment, while the remaining three passengers and the crew deplaned via the escape chute. Total egress time for both the passengers and the crew was approximately 30 seconds, and all occupants moved quickly out of the immediate area of the burning aircraft.

1.15 Tests and Research

None.

1.16 Eastern Air Lines Operating Procedures

Eastern Air Lines operating procedures, as specified in the EAL DG9 Flight Manual state that the recommended final approach glidepath for a localizer-only approach is the same as is used for the standard ILS approach. For a normal approach, the landing configuration is gear down and flaps extended 50°. The procedures state that 50" flaps should be established early on the final approach and at the OM on an ILS approach.

In accordance with these instrument approach procedures, the pilot not flying the airplane will call out altitude, airspeed, rate of descent, and the result of the instrument warning flag scan at 1,000 feet and at 500 feet above the field elevation. He will also call out decision height or minimum descent altitude, runway in sight, and any significant deviations from the programmed airspeed and/or desired descent rate.

The EAL Flight Standards Manual outlines various aspects of crew coordination and crew-

member operating techniques. With respect to the use of checklists it states:

"... the proper use of all checklists, it being the captain's responsibility to see that the checklist is properly used; however, the pilot manipulating the controls will be expected to call for the checklist at the proper time. The challenge-respond concept will be used."

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The flight operated without difficulty and in visual flight conditions from its origination in Miami until the latter stage of the landing approach to Fort Lauderdale. It was at this point that the aircraft entered an area of heavy rain, control of the aircraft was transferred from the first officer to the captain, and a high descent rate developed, which resulted in the landing accident.

The most obvious factor in the accident sequence was the adverse weather existing at the time of the landing approach. All witnesses located in the vicinity of the approach end of the runway, as well as controllers in the tower cab, stated that a heavy rainshower was in progress at the airport and that the visibility in the area was very poor due to the rain. The measured visibility of one-half mile, reported to the flight by air traffic controllers on two occasions prior to the landing attempt, was below the published minimums required for the approach.

Although the captain testified that he had the approach end of the runway in sight at all times throughout the final approach and landing, there is little evidence to support this statement. Testimony by the first officer clearly indicates that he himself had almost no forward visibility at the time the captain took control of the aircraft and that because of the heavy rain, he did not actually see the runway until almost over the highway adjacent to the airport boundary. (The sound of heavy rain, followed by the sound of windshield wiper operation, commences on the CVR recording approximately 57 seconds prior to impact.) Also, the intracockpit conversation recorded on the CVR during the last 4 minutes of the flight indicates that at various times during the approach, there was uncertainty on the part of the crew as to the exact location of the airport. In view of the foregoing statements and in consonance with the circumstances of the accident, it is concluded that heavy rainshowers were obscuring the runway during the final stages of the approach and that the landing was continued under these conditions.

From an evaluation of the statements of both pilots in conjunction with the transcript of the CVR, it appears that the final descent was commenced by the captain shortly after the airplane passed the middle marker position, just prior to reaching the end of the runway. The initial touchdown point, as evidenced by tire skid marks, was approximately 1,020 feet from the end of the runway. According to the captain, the descent was initiated from the MDA altitude of 460 feet; thus, the aircraft would have descended 450 feet between 1521:10.5 (the end of middle marker sound on CVR) and 1521:24.08 (end of CVR recording). This would correspond to an average descent rate of nearly 2,000 ft./min. The degree of airframe breakup at impact further verifies a high touchdown descent rate, which was far in excess of the design limitations of the aircraft.

The captain stated that he believed he encountered a severe downdraft associated with the heavy rainshower, and that this might have accounted for his inability to arrest the descent rate and thus preclude the hard impact on the runway. Although it is true that severe downdrafts are likely to exist under such conditions, there were no observations or other related evidence found in this case to substantiate the occurrence of this phenomena.

More significant is the fact that the throttles were retarded to the full closed position and that the aircraft was in the full landing configuration (50° flaps, landing gear down) at idle power throughout the final descent. The combinations of the high drag configuration and the reduced power would result in a relatively high rate of sink. At high rates of descent, the proper flare altitude above the runway becomes critical and can be difficult to assess even under ideal landing conditions. It is understandable, then, that under conditions of reduced visibility in heavy rain, determination of the proper flare altitude would be extremely difficult; for this reason, a high sink rate maneuver in the **final** approach zone should not be attempted. In fact, continuance of the landing approach under the abovedescribed conditions is contrary to the prescribed operating practices and procedures applicable to this flight. It is evident that the alternative available to the pilot under these conditions would have been the initiation of a missed-approach, rather than a continuation of the landing approach.

Although the captain stated that he did not hear the weather reports in which the thunderstorm, heavy rainshowers, and the visibility were reported and that he was not advised of the one-half mile visibility by the first officer, he should have been aware of the existing conditions. Aside from the two direct weather advisories to the flight, there was considerable radio conversation between Miami approach control and the preceding Northeast flight concerning minima, both with regard to visibility and the inoperative glide slope. There was also a direct query to EAL 346 regarding the company's required weather minima with the glide slope inoperative, and, shortly thereafter, approach control asked if the flight was going to make the approach. The captain stated that he was on a company communications frequency during much of the flight and did not hear the relevant information concerning the weather situation. However, a review of the CVR transcript shows that he was on the air traffic control frequency during some of the above converstations, particularly when asked by approach control, ". . . are you going to make the approach?" Moreover, the thunderstorm in the immediate vicinity of the airport was visible to the crew as the flight approached the Fort huderdale area and remained so throughout the approach. In view of the characteristics commonly associated with these storms, i.e., heavy rain and reduced visibility, it would seem inconceivable that the captain would not seek more information concerning the existing visibility at the airport if he was not already aware of the situation.

In any event, the captain's responsibility for safe conduct of the flight certainly extends to assuring that he has obtained pertinent landing information before deciding to commence an approach.

The training records of the captain indicate that he was a knowledgeable and highly proficient pilot. There were no instances cited that would point to any tendency on his part to deviate from the prescribed operating procedures. The fact that the flight had been conducted almost entirely in visual flight conditions and that the airport environment had been in sight during much of the approach might have misled the captain into believing that the local rainshowers were much lighter in intensity and smaller in scope than actually was the case. However, despite attempts to investigate this particular point the Safety Board is unable to find a plausible explanation for the captain's decision to initiate and continue the approach under the existing conditions.

This accident demonstrates the primacy of pilot-in-command responsibility. Section 121.533 of the Federal Aviation Regulations delineates areas of operational control and the shared responsibility between pilot and dispatcher relative to the safety of flight. It further describes certain actions to be taken by dispatchers in keeping the pilot informed of changes in weather conditions which may affect flight safety. However,, in this instance, it

was unrealistic to expect the dispatcher to keep ahead of rapidly changing terminal weather conditions. The flightcrew and the FAA tower controller were in a better position to assess the terminal weather conditions and their adquancy for landing.

The ultimate responsibility for decisions affecting the safety of the passengers, as well as the crew, the cargo, and the airplane, rests with the pilot-in-command while the airplane is in flight. However, it is incumbent upon the air carrier, through its operating procedures, training, supervision, and exercise of operational control, to assure that the pilot-in-command is able to conduct the flight in consonance with the duty of the air carrier to perform its service ith the highest possible degree of safety. In this instance, the decision of the pilot-in-command to initiate the approach was made either without obtaining available information on visibility or without full consideration of the visibility information communicated to the flight.

An analysis of the pilot-in-command's management of this flight shows that crew coordination and performance was undisciplined. For example: checklist items were not accomplished in accordance with the EAL challenge and response system; the flight did not report passing the OM as requested by air traffic control; the flight initiated the landing without the prescribed landing clearance; and the approach and landing techniques were not in accordance with company instrument approach procedures. Considered collectively, these factors bear a significant relationship to the overall chain of events leading to this accident. The Safety Board concludes that the approach should not have been initiated under the existing conditions.

2 Conclusions

(a) Findings

1. The crew was qualified and certificated for the operation.
2. The aircraft was certificated and maintained in accordance with applicable regulations.
3. The flight was dispatched in accordance with the applicable regulations.
4. The aircraft weight and balance were within prescribed limits.
5. The flight was cleared for a straight-in, localizer-only ILS approach to Runway 9L at the Fort Lauderdale-Hollywood International Airport.
6. A heavy rainshower was occurring at the Fort Lauderdale Airport at the time of the approach and landing of EAL 346.
7. The inoperative condition of the ILS glide-slop component was reported to the flight.
8. The reported visibility was below the authorized landing minima.
9. The existing weather conditions as reported to EAL 346 by air traffic control were acknowledged by the first officer.
10. The captain initiated an approach for landing when the visibility was less than that authorized.
11. The flight did not report the OM inbound, as requested by the tower controller.
12. The flight did not receive a landing Clearance.
13. The first officer flew the airplane from its departure at Miami to the vicinity of the middle marker where the captain assumed control.
14. The final descent was commenced from an altitude of approximately 460 feet m.s.l. in the vicinity of the middle markter.
15. The aircraft impacted the runway 1,020 feet from the approach end.

16. There was no failure or malfunction of the airplane structure, powerplants, or components prior to impact.
17. Flightcrew procedures were not conducted in accordance with prescribed company procedures.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the decision of the pilot to initiate and continue an instrument approach under weather conditions which precluded adequate visual reference and the faulty techniques used by the pilot during the landing phase of that approach.

The Board also finds that the flihtcrew's nonadherence to prescribed operational practices and procedures compromised the safe operation of the flight.

3. RECOMMENDATIONS

The Safety Board is concerned with the fact that the aviation industry continues to be plagued by accidents which occur during the approach and landing phase of flight. These accidents tend to demonstrate the same deficiencies; namely that the approved operating procedures and normal flightcrew discipline are being modified or ignored to the extent that an accident ensues.

In a letter to the Adminstrator of the Federal Aviation Administration dated January 19, 1969, the Board expressed concern about the incidence of accidents that occurred during the approach and landing phases of flight. In that letter, we recommended several measures aimed at reducing these occurrences.

The FAA issued Air Carrier Operations Bulletin No. 71-9, which emphasized the common faults noted in the execution of nonprecision approaches, and proposed several recommendations to eliminate these faults. The Board endorsed this Bulletin, both as to content and intent.

However, in the light of recent events, we must reiterate our concern with the problem of approach and landing accidents, and reemphasue the importance of flightcrews' adhering more meticulously to approved procedures and regulations.

In view of the foregoing, the Safety Board recommends that the Federal Aviation Administration:

1. Reemphasize to all flight crewmembers the necessity for total crew coordination and adherence to approved procedures. (Recommendation No. A-72-224).
2. Insure that all flight crewmembers are currently apprised of the contents of Air Carrier Operations Bulletin 71-9, emphasizing that a "nonprecision" approach requires as much, if not more, crew coordination than a "precision" approach because of the lack of precise guidance from electronic navigational aids outside the aircraft. (Recommendation No. A-72-225).

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

December 13, 1972

INVESTIGATION AND HEARING

1. Investigation

The Board received notification **of** the accident at approximately 1545 on May **18,** 1972, from the Federal Aviation Administration. An investigating team was immediately dispatched to the scene of the accident. Working groups were established for Operations, Air Traffic Control, Weather, Human Factors, Witnesses, Powerplants, Systems, Structures, and Cockpit Voice Recorder. Parties to the investigation included Eastern Air Lines, the Federal Aviation Administration, Douglas Aircraft Company, and the Air Line Pilots Association.

2. Depositions

Depositions were taken at Fort Lauderdale, Florida, on May 23,1972, and at Newark, New Jersey, on August 23,1972.

3. **Preliminary** Reports

A preliminary aircraft accident summary report was releases by the Safety Board on July 20, 1972.

CREW INFORMATION

Captain Walter C. Kennedy, aged **49,** was employed by Eastern Air Lines on November **16, 1953.** He held Airline Transport Pilot Certificate **No. 517528** with type ratings in the Douglas **DG9,** Lockheed **L-188, L-1049,** and Martin 202/404 aircraft. His last first-class medical certificate was dated March **27, 1972,** and was issued with no waivers.

Captain Kennedy had a total of **16,500** flying hours, of which **960** hours were in **DG9** aircraft. His last flight proficiency check was conducted on March **22, 1972,** and his last line check was on May **10, 1972.** He completed recurrent ground training on March **15, 1972.**

First Officer George K. Mathis, Jr., aged **30,** was employed by Eastern Air Lines on July **12, 1966.** He held Commercial Pilot Certificate **No. 1689493** with aircraft single-engine land and instrument ratings. His last first-class medical certificate was dated August **20, 1971,** and was issued with no waivers.

First Officer Mathis had a total of **3,000** flying hours, of which **1,500** hours were in **DG9** aircraft. His last flight proficiency check was conducted on February **25, 1972,** and he completed recurrent ground training on February **10, 1972.**

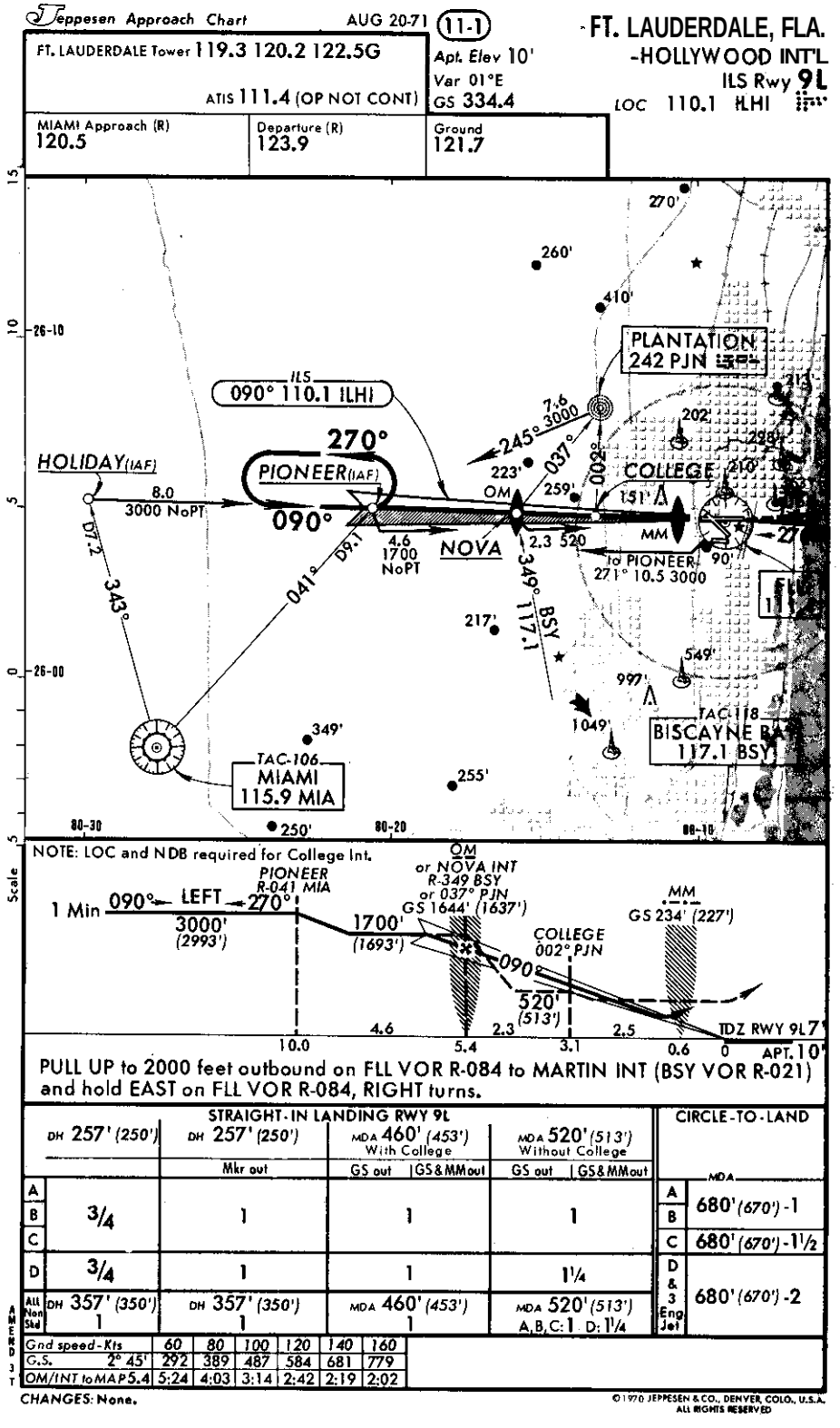
Both the captain and first officer had a total of **12** hours and **13** minutes crew rest time prior to reporting for duty for this flight.

AIRCRAFT HISTORY

Aircraft N8961E, a Douglas DC9-31, was manufactured on June **22,** 1968. The last major inspection was accomplished **230** aircraft flight-hours prior to the accident. The airplane had accumulated a total **of 10,928.24** flight hours at the time of the accident.

A review of all aircraft and component maintenance records showed that all inspections and overhauls had been performed within the prescribed time limits and that the aircraft had been maintained in accordance with all company procedures and FAA directives.

The computed landing **gross** weight of the aircraft was 83,513 pounds with a center **of** gravity (c.g.) **of 22.3** percent. Both the weight and c.g. were within prescribed limits.


Jeppesen Approach Chart
AUG 20-71
11-1
FT. LAUDERDALE, FLA.
-HOLLYWOOD INT'L
ILS Rwy 9L
LOC 110.1 ILHI
FT. LAUDERDALE Tower 119.3 120.2 122.5G
ATIS 111.4 (OP NOT CONT)
Apt. Elev 10'
Var 01°E
GS 334.4
MIAMI Approach (R) 120.5
Departure (R) 123.9
Ground 121.7
ILS
090° 110.1 ILHI
HOLIDAY(IAF)
PIONEER(IAF)
270°
090°
8.0
3000 NoPT
4.6
1700
NoPT
NOVA
2.3 520
MM
to PIONEER
271° 10.5 3000
COLLEGE
002°
OM
223'
259'
151'
PLANTATION
242 PJN
245° 7.6 3000
037°
343°
041°
D7.2
D9.1
349° 17.1
BSY
BISCAYNE BAY
117.1 BSY
TAC-118
TAC-106
MIAMI
115.9 MIA
217'
549'
997'
1049'
349'
255'
250'
270'
260'
410'
202'
210'
26-10
26-00
80-30
80-20
80-10
NOTE: LOC and NDB required for College Int.
1 Min 090° LEFT 270°
PIONEER R-041 MIA
3000' (2993')
1700' (1693')
OM or NOVA INT R-349 BSY or 037° PJN
GS 1644' (1637')
COLLEGE 002° PJN
090°
520' (513')
MM
GS 234' (227')
10.0
4.6
5.4
2.3
3.1
2.5
0.6
0
TDZ RWY 9L
APT. 10'
PULL UP to 2000 feet outbound on FLL VOR R-084 to MARTIN INT (BSY VOR R-021) and hold EAST on FLL VOR R-084, RIGHT turns.
STRAIGHT-IN LANDING RWY 9L
CIRCLE-TO-LAND
DH 257' (250')
DH 257' (250')
MDA 460' (453') With College
MDA 520' (513') Without College
Mkr out
GS out
GS&MMout
MDA
A
B
C
D
3/4
1
1
1
680' (670') -1
680' (670') -1½
1¼
680' (670') -2
All Non Skd
DH 357' (350')
MDA 460' (453')
MDA 520' (513')
A,B,C:1 D:1¼
D & 3 Eng Jet
Gnd speed-Kts 60 80 100 120 140 160
G.S. 2° 45' 292 389 487 584 681 779
OM/INT to MAP 5.4 5:24 4:03 3:14 2:42 2:19 2:02
CHANGES: None.
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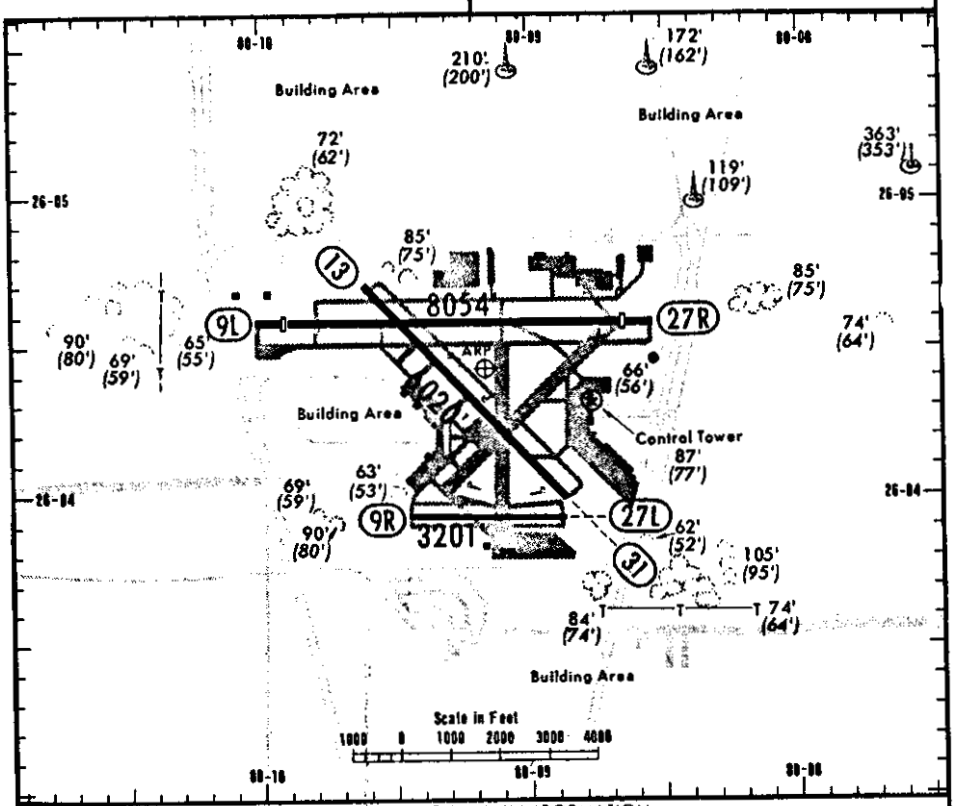
FT. LAUDERDALE, FLA.
-HOLLYWOOD INT'L APT.

Elev 10' N26 04.4 W080 09.2

(11-1) AUG 20-71 — Jeppesen Approach Chart

NOTE: Airport of entry



ADDITIONAL RUNWAY INFORMATION

RWY	LIGHTING	USEABLE LENGTHS — LANDING BEYOND — Threshold	Glide Slope	TAKE-OFF	WIDTH
9R 27L	RL				100'
9L 27R	RL	7452' 7441'	7054'		150'
13 31	RL				150'

	AIR CARRIER TAKE-OFF				ALTERNATE CEILING-VISIBILITY	
	TAKE-OFF ALTN FILED WITHIN 15 Min Piston - 30 Min Turbine	TAKE-OFF ALTN FILED WITHIN: 1 Hr 2 Eng - 2 Hr 3 & 4 Eng.		TAKE-OFF ALTN NOT FILED	ILS Approach	Other Approach
	SCHEDULED		Altn Apt & Non-Skd	All Carriers		
2 Eng Tailwheel	1/2	1	1	Landing Weather Minima	600-2	800-2
2 Eng Tricycle	1/4				Non-Skd 3 & 4 Eng Jet 700-2	
3 & 4 Eng		1/4				

CHANGES: Taxiways.

APPENDIX E

COCKPIT VOICE RECORDING

TRANSCRIPTION OF PERTINENT COMMUNICATIONS

Subject: Eastern Air Lines, Inc.,
DC-9, N8461E,
Fort Lauderdale, Florida
May 18, 1972

TRANSCRIPTION OF PERTINENT COMMUNICATIONS ON LAST PORTION OF COCKPIT VOICE RECORDING - EASTERN AIR LINES DC-9, N8961E, FORT LAUDERDALE, FLORIDA

LEGEND

CAM	Cockpit area microphone voice or sound source
RDO	Radio transmission from N8961E
MIA AR	Miami Tower Arrival Radar
FLL LC	Ft. Lauderdale Tower Local Control
MIA DR	Miami Tower Departure Radar
MIA LC	Miami Tower Local Control
ARINC	Aeronautical Radio, Inc., Annapolis, Md., station
NE57	Northeast Airlines Flight 57
-1	Voice identified as Captain
-2	Voice identified as First Officer
-?	Voice unidentified
*	Unintelligible word
#	Non-pertinent word
( )	Questionable text
(( ))	Editorial insertion
%	Break in continuity
GMT	Greenwich Mean Time (Time used in report.)

INTRA – COCKPIT

TIME (GMT) AND SOURCE	CONTENT
CAM	Sound of two chimes
CAM-2	Anti-skid?
CAM-1	Yeah
CAM-1	You all set?
CAM-2	Yeah
CAM-2	We're, ah, cleared to the, ah, VOR of Fort Lauderdale --vectors
CAM-1	Left turn?
CAM-2	Zero four zero
CAM-?	---***
CAM-2	** set
CAM-1	If the airplane's going to work, I hope that pressurization is going to work
CAM-2	Yeah

AIR-GROUND (ATC)

TIME (GMT) AND SOURCE	CONTENT
1910:10	
MIA LC	Eastern three forty-six, taxi into position and hold
RDO-2	Position and hold, three four six
	%%
1910:46	
MIA LC	Eastern three forty-six cleared for takeoff
RDO-1	Clear to go
	%%
1911:38.5	
RDO-1	Departure man, Eastern three forty-six
MIA DR	Eastern three forty-six, this is Miami Departure, turn left heading of three ten for vectors to Fort Lauderdale

INTRA - COCKPIT

TIME (GMT) AND SOURCE	*CONTENT*
1912:03.7	
CAM-2	Flaps up
CAM-l	I'll just leave all that #out
CAM-1	I'd leave all that #out anyway **till** you get - - you know, noise abatement
CAM-1	Flaps * * *
CAM	Sound of stabilizer trim signal ((many times during flight))

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	*CONTENT*
RDO-1	Three ten, roger
MIA DR	Disregard that, climb to three thousand, turn left heading of three sixty when you leave two thousand, and then I'll have **a** turn for you in just a minute
1911:56.5 RDO-1	Ah, roger, we're gonna do that, three sixty and up to three
	% %
1912:37.6 RDO	Sound of weather broadcast on VOR
	% %
1913:14 RDO-1	Eastern, ah, three forty-six maintaining three
MIA DR	Eastern three forty-six turn left to heading of, ah, ah, three zero zero
RDO-1	Three zero zero, roger
	% %
1913:37 MIA DR	Eastern three forty-six, change to Miami Approach on one twenty point five, good day

INTRA –COCKPIT

TIME (GMT) AND SOURCE	*WNTENT*
CAM	Sound of landing gear warning horn

AIR-GROUND (ATC)

TIME (GMT) AND SOURCE	*WNTENT*
RDO-1	Twenty oh five, have a happy
191344 RDO-1	Hello, approach man, Eastern three forty-six maintaining three
MIA AR	Roger, Eastern, ah, three forty-six, fly heading three zero zero, maintain three thousand, vector runway nine left fmal approach course following a northeast, ah, DC-nine that's northwest of the airport there inbound now
RDO-1	Okay, how about a three twenty heading here?
MIA AR	Three twenty's okay, I'll have to turn you westbound a little hit though to parallel the localizer outbound
RDO-1	Okay, we're just trying to stay dear of some showers, that's all
MIA AR	Yes sir, that's good enough
191413.5 RDO-1	Ah, take two thousand, help
MIA AR	Can give it to you in a couple of miles. Right over the top of Opa Locka right now, we gotta he three there
RDO-1	Okay
NE57	Northeast five seven, three thousand
1914:25 MIA DR	Northeast five seven, continue descent - - -
1914:27 RDO-1	Miami, three forty-six

INTRA –COCKPIT

TIME (GMT) AND SOURCE | *WNTENT*

ARINC COMMUNICATIONS

1914:38.5
RDO-1 Miami, Eastern three forty-six

191451.7
RDO-1 Miami, Eastern three forty-six

ARINC Three four *six*, Washington, go ahead

1914:58.1
RDO-1 Okay, three forty-six our Miami times are, ah, on the hour and eleven, and twenty-four six fifty-two on the petrol and, ah, that'll do it, I guess

AIRGROUND (ATC)

TIME (GMT) AND SOURCE | *CONTENT*

MIA AR --- one thousand seven hundred, and for your information that transmitter's --- (1914:30.7) ((at this point **MIA AR** communications stop on captain's channel but continue on fvst officer's channel))

AIRGROUND (ATC)

MIA AR --- kinda weak

NE57 Okay, we're leaving three for seventeen. How's this one?

MIA AR Better, thank you

191436
MIA AR Eastern three forty-six, descend and maintain two thousand

RDO-2 Out of three for two thousand, Eastern three forty-six

1915:58
MIA AR Eastern three forty-six reduce to one eight zero knots

RDO-2 One eight zero knots, three forty-six, we have traffic low, looks to be about a thousand or fifteen hundred feet

1915:07
MIA AR Roger, new weather at Lauderdale, estimated seven hundred overcast, one-half mile, thunderstorm, heavy rainshower

RDO-2 Three forty-six

ARINC COMMUNICATIONS

TIME (GMT) AND SOURCE	*CONTENT*
1915:13.2 ARINC	Ah, three forty-six, you say you had a Selcal, sir?
RDO-1	Ah, Charlie How Able King, please
ARINC	One forty-six, stand by, please
1915:25.7 RDO	Sound of Selcal signal
1915:28.9 MO-1	You rang the chime, thank you, sir

INTRA-COCKPIT

CAM-1	Ah, #
CAM-1	Put it
1915:42.2 CAM-2	The glide slope is out, they've got seven hundred overcast . .
CAM-1	*

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	*CONTENT*
1915:17 NE57	Ah, Northeast five seven, we need threequarters
MIA AR	Roger, Northeast five seven, climb to three thousand, turn, ah, ah, left heading zero nine zero, expect another turn circling up there till we get better weather
NE57	Okay, zero nine zero and back up to three, five seven
1915:32 MIA AR	Okay, sir, and the glide slope's out of service for Northeast five seven and Eastern three forty-six
1915:33.2	((MIA AR transmissions resume on captain's channel))

AIRGROUND (ATC)

1915:39 MIA AR	Eastern three forty-six what do you need to shoot at it with the glide slope out?
NE57	Northeast fifty-seven
1915:45.6 RDO-1	Ah, moment

INTRA - COCKPIT

TIME (GMT) AND SOURCE	CONTENT
CAM-2	--- he wants to know what we need for, ah, a glide slope out
CAM-2	Maybe we'll get **some** lower here
CAM-2	How 'bout lower?
CAM	Sound of landing gear warning horn
CAM-2	How 'bout lower?
CAM-2	We can't get any lower here

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	CONTENT
1915:51.5 **MIA AR**	Eastern three forty-six turn left heading two seven zero
RDO-2	Two seven zero, three forty-six, can we get lower?
MIA AR	Ah, are you going to make the approach?
1916:01.5 RDO-1	Four, four sixty we need. If we got seven hundred is enough
1916:06 **MIA AR**	Okay, *sir*, ah, descend to one thousand seven hundred. turn right heading three six **zero**
RDO-1	Three sixty down to seven, -- to, ah, say again
1916:15 **MIA AR**	Three forty-six descend to one thousand seven hundred, turn right heading three *six* zero, reduce to one *six* zero knots now, please
RDO-1	Okay, ah
191626.5 **MIA AR**	Northeast five seven, understand you need three quarters of a mile, is that correct?

INTRA – COCKPIT

TIME (GMT) AND SOURCE	*CONTENT*
CAM-1	Let's go down underneath the * * *
CAM-1	Nope
CAM-l	We'll, ah, we'll probably be underneath the ceiling
CAM	Sound of landing gear warning horn
CAM-1	* * * one ten one on the right
CAM-1	He's, un, - - -
CAM-2	Gimme five * *
CAM-1	We're due at seventeen, eighteen. That'll give us scheduled time

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	*CONTENT*
1916:30 **NE57**	Well, with the glide slope out we need one mile now and we're maintaining three
MIA AR	Okay, understand, sir, I'll let you know as soon as I can get it and I'lljust circle you in that area. Is that area pretty good at that altitude?
NE57	Ah, yes, we can circle around here, we can, ah, stay VFR for a while
1916:43.5 MIA AR	Eastern three forty-six turn right heading zero seven zero, cleared straight-in, ah, localizer runway nine left approach Fort Lauderdale-Hollywood Airport. Glide slope inoperative
1916:52.3 RDO-1	Three forty-six, right
1916:59.5 **MIA AR**	Eastern three forty-six contact the tower one nineteen three
RDO-1	Nineteen three and a happy

INTRA - COCKPIT

TIME (GMT) AND SOURCE	CONTENT
1917:11.8 CAM-1	There's the # # airport right up there, ain't it?
CAM-2	Straight ahead of **us?**
CAM-1	Yeah
CAM-1	*
CAM-1	(You gotcha)
1918:21.9 CAM-2	Gear down and final check
1918:25 *CAM*	Sound of landing gear in transit
1918:39.5 CAM-2	(What's the distance) to the airport?
1918:46.5 CAM-1	Get it lined up with - -
1918:50.1 *CAM-2*	Put the, ah, **ah,** VOR **on yours**
1918:55.2 CAM-?	(Call once you pass) the airport is up in the shower

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	CONTENT
1918:25 RDO-1	Tower man, Eastern three forty-six
FLL LC	Eastern three forty-six, Fort Lauderdale tower, report the marker inbound for **nine** left, wind **one** eight **zero** degrees, ten
RDO-1	(Right)
1918:34 FLL LC	(We're) estimated **seven** hundred overcast half mile, thunderstorm, heavy rain shower over the airport
	% %

INTRA – COCKPIT

AIR-GROUND (ATC)

TIME (GMT) AND SOURCE	*CONTENT*	*TIME (GMT) AND SOURCE*	*CONTENT*
1919:03.9 CAM-1	Right, you got the localizer on yours?		
CAM-2	Yeah		
1919:09 CAM-2	Gimme twenty-five		
CAM	Sound similar to flap handle entering detent		
CAM	Sound of chime		
CAM	Sound of switches		
1919:24.2 CAM-1	Now you'd better get over there, get on the **localizer**		
1919:33.1 RDO	Sound of company flight taking **to** Vero Beach on ramp frequency ((on captain's audio channel only))		
1919:35.8 ***CAM-2***	That's four hundred and sixty feet		
1919:43.8 **CAM-2**	I haven't heard that marker come in yet		
1920:19.4 CAM-1	(There's nothing under us)		
1920:21.4 CAM-2	See if they **can** give us **a** radar **fix** to see how far we're **out**		
CAM-1	(Tuck it in)		
192025.5 CAM-2	Fifty **flaps**		
CAM-1	I'd use ((pause)) twenty-five		

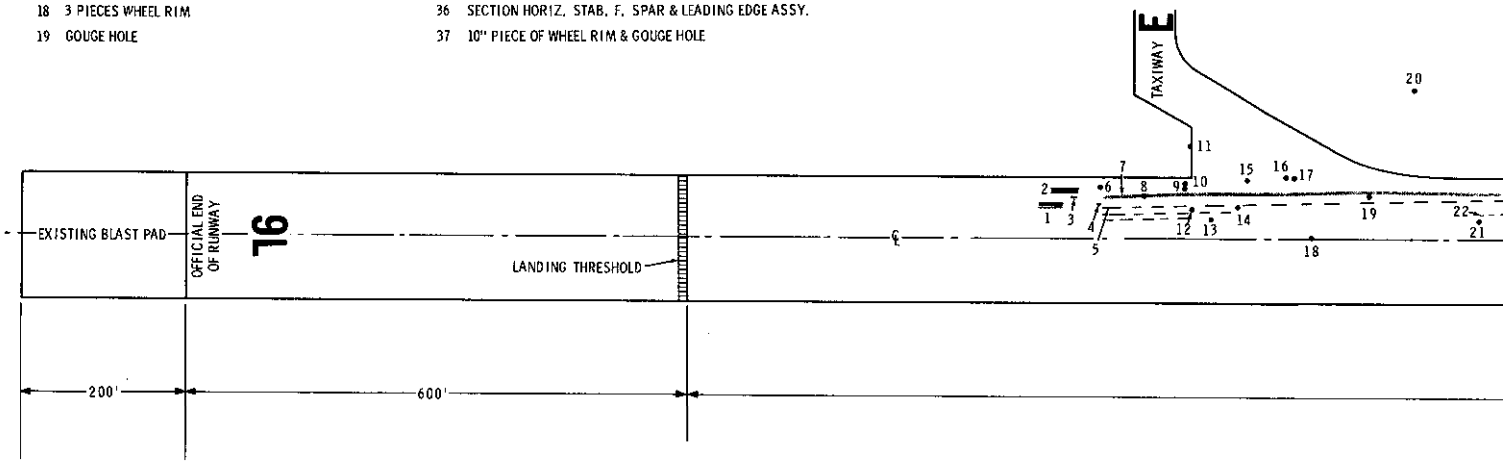
INTRA - COCKPIT

TIME (GMT) AND SOURCE	*CONTENT*
1920:31.1 CAM	Sound similar to encounter with heavy rain
1920:34.5 CAM	Sound of windshield wiper operation commences
CAM-2	* * *
1921:04 RDO	Sound of middle marker ((on fvst officer's channel only -ends at 1921:10.5))
1921:17 CAM-2	There's the runway, right under us
CAM	Sound of horizontal stabilizer trim signal
1921:24.8	End of Recording

AIRGROUND (ATC)

TIME (GMT) AND SOURCE	*CONTENT*
1920:41.5 FLL LC	Eastern three forty-six, our glide slope appears to be back in
RDO-1	Yeah, I know it ((transmitted on company frequency))
1920:46.5 FLL LC	It just went out again
	% % %

NO.	DESCRIPTION
1	R. M. GEAR TOUCHDOWN POINT & TIRE SCRUB MARKS
2	L M GEAR TOUCHDOWN POINT & TIRE SCRUB MARKS
3	GOUGE IN RUNWAY
4	GOUGE IN RUNWAY
5	R. WING FLAP HINGE BRACKET GOUGES & SCRAPE MARKS
6	AREA OF SMALL PIECES OF RED GLASS
7	NOSE GEAR TIRES SCRUB MARK TRACKS
8	SHIM - EMPENNAGE TO FUSELAGE JOINING SECTION
9	PIN 2419184
10	PIN - 7619-510 ALUM. & FIBERGLASS
11	STATIC WICK & PIECE OF FIBERGLASS
12	8" SECTION WHEEL RIM
13	OUTB'D. FLAP HINGE FAIRING
14	STATIC WICK
15	RIB - TRAILING EDGE WING x TE 135.619
16	4' SECTION HYD. LINE
17	DOOR. R. M. GEAR - WING
18	3 PIECES WHEEL RIM
19	GOUGE HOLE
20	8" SECTION WHEEL RIM & SECTION WING T. EDGE
21	FLAP VANE - T. E. FLAPS & P/N 5023142-5601
22	SCRAPE MARKS
23	FLAP VANE - T. E. FLAPS
24	PIECE OF AUX. WING SPAR
25	STRIP - INB'D. WING - UPPER T. E. - INB'D.
26	DOOR - L. M. GEAR - WING
27	LARGE ROLLER BEARING & BRACKET
28	GOUGE HOLE
29	ACCESS DOOR - STARTER VALVE
30	R. INB'D. FLAP HINGE SCRAPE MARKS CROSSED NOSE GEAR TIRES SCRUB MARKS
31	PANEL - INB'D WING - UPPER T. E. - INB'D.
32	SECTION OF HORIZ. STAB. TIP
33	ALUM. RING & FLEXIBLE DUCT CONNECTOR
34	2 SECTIONS HYD. LINES - 5' - ELEV. RETURN
35	PIECE OF BHD. & CAP WING STA. x 111.500
36	SECTION HORIZ. STAB. F. SPAR & LEADING EDGE ASSY.
37	10" PIECE OF WHEEL RIM & GOUGE HOLE
38	RESTRICTER ASSY. - M.L.G. SHOCK STRUT - FLUID FLOW
39	LARGE ROLLER BEARING
40	CONE-VERT. STAB. ACTUATOR ACCESS
41	SECTION - L. E. LN.
42	GOUGE HOLE
43	SECTION ELEV. T. E.
44	EMPENNAGE
45	GOUGE AND SCRAPE MARKS
46	SECTION OF ELEV. L. E. WITH BZ
46	SECTION OF ELEV. L. E. WITH BALANCE WEIGHT
47	GOUGE HOLE
48	R. M. GEAR STRUT PISTON & WHEEL ASSYS.
49	R.M. GEAR ASSEM. & ATTACHING STRUCTURE
50	NOSE GEAR TIRE
51	NOSE GEAR TIRE
52	AIRCRAFT CAME TO REST

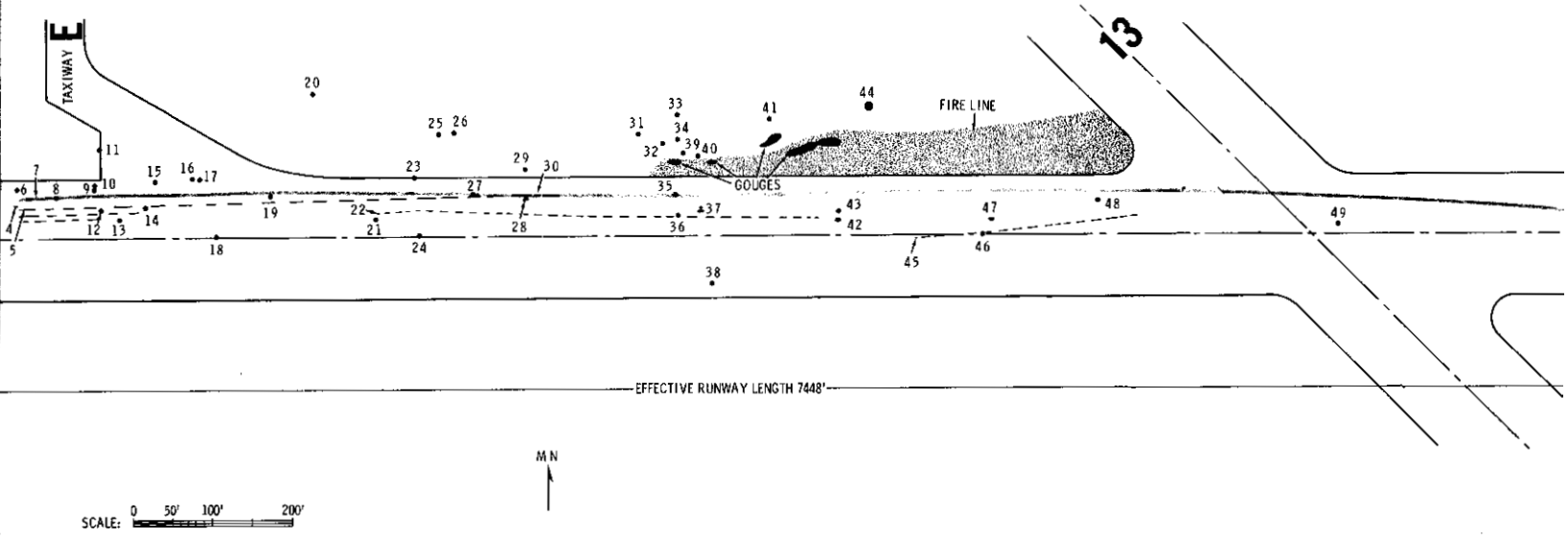


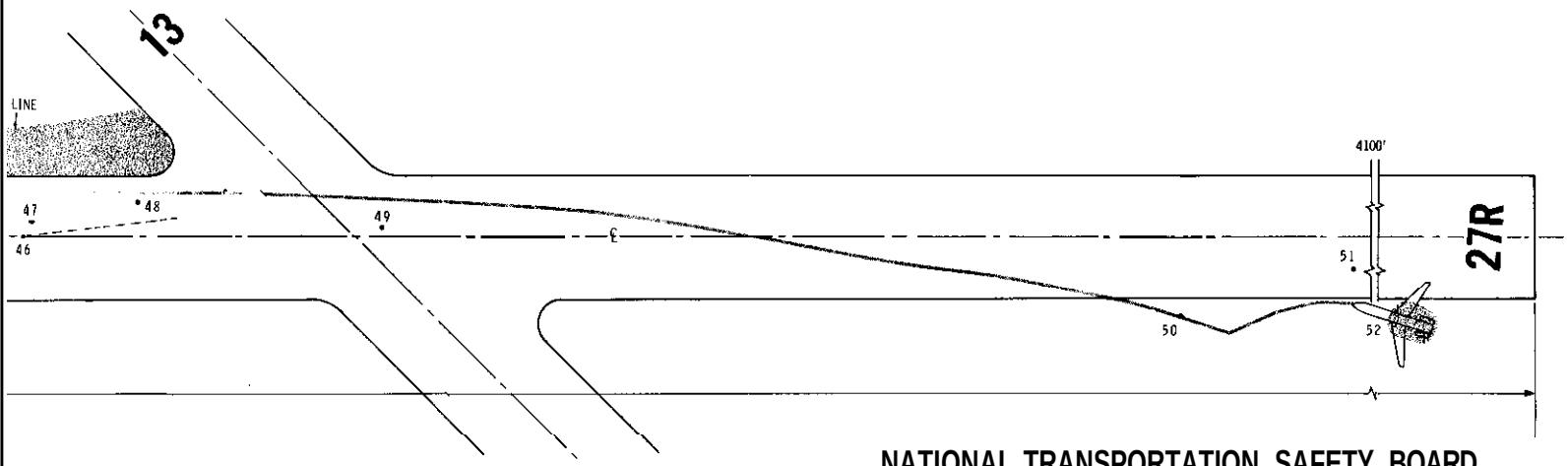
SCALE: 0 50' 100' 200'

TRUT - FLUID FLOW

WEIGHT

SYS.
UCTURE





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