

File No. 1-0012

AIRCRAFT ACCIDENT REPORT

TRANS WORLD AIRLINES, INC.

BOEING 707-131B, N757TW

LOS ANGELES INTERNATIONAL AIRPORT

LOS ANGELES, CALIFORNIA

JANUARY 16, 1974

ADOPTED: AUGUST 14, 1974

NATIONAL TRANSPORTATION SAFETY BOARD

Washington, D.C. 20591

REPORT NUMBER: NTSB-AAR-74-10

1. Report No. NTSB-AAR-74-10	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Aircraft Accident Report - Trans World Airlines, Inc., Boeing 707-131B, N757TW, Los Angeles, California, January 16, 1974		5. Report Date August 14, 1974	6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.	
9. Performing Organization Name and Address National Transportation Safety Board Bureau of Aviation Safety Washington, D. C. 20591		10. Work Unit No. 1342	11. Contract or Grant No.
		13. Type of Report and Period Covered Aircraft Accident Report January 16, 1974	
2. Sponsoring Agency Name and Address NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20591		14. Sponsoring Agency Code	
5. Supplementary Notes			
16. Abstract About 0135 p.d.t, on January 16, 1974, the nose landing gear of Trans World Airlines, Inc., Flight 701, collapsed upon touchdown after a night visual approach to runway 6R at the Los Angeles International Airport. Of the 58 passengers and 7 crewmembers on board, 8 persons were injured. All injuries were incurred during the emergency evacuation. A postcrash fire destroyed the fuselage. The National Transportation Safety Board determines that the probable cause of the accident was the continuation of a visual approach after the flightcrew lost outside visual reference because of a low cloud and fog encounter.			
17. Key Words Visual approach, aircraft instruments, altimeter, fog, low clouds, runway lights, approach lights, nose landing gear, abandoned approach, hydraulic fluid, fire, emergency evacuation.		18. Distribution Statement This report is available to the public through the National Technical Information Service, Springfield, Virginia 22151	
19. Security classification (of this report) UNCLASSIFIED	20. Security Classification (of this page) UNCLASSIFIED	21. No. of Pages 27	22. Price

TABLE OF CONTENTS

	Page
Synopsis	1
1. Investigation	1
1.1 History of the Flight	1
1.2 Injuries to Persons	4
1.3 Damage to Aircraft	4
1.4 Other Damage	4
1.5 Crew Information	4
1.6 Aircraft Information	4
1.7 Meteorological Information	4
1.8 Aids to Navigation	5
1.9 Communications	5
1.10 Aerodrome and Ground Facilities	5
1.11 Flight Recorders	6
1.12 Aircraft Wreckage	6
1.13 Medical and Pathological Information	7
1.14 Fire	8
1.15 Survival Aspects	8
1.16 Tests and Research	9
1.17 Other Information	9
1.17.1 New Building for Fire Department	9
1.17.2 Airport Operating Procedures	10
2 Analysis and Conclusions	10
2.1 Analysis	10
2.2 Conclusions	12
(a) Findings	12
(b) Probable Cause	13
3. Recommendations	13
Appendices	
Appendix A - Investigation and Hearing	15
Appendix B - Crew Information	16
Appendix C - Aircraft Information	17
Appendix D - Flight Data Recorder Graph	19
Appendix E - Sketch of Runway Tire Marks	21
Appendix F - Safety Recommendations A-74-45 thru 52 ..	22

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591

AIRCRAFT ACCIDENT REPORT

Adopted: August 14, 1974

TRANS WORLD AIRLINES, INC.
BOEING 707-131B, N757TW
LOS ANGELES INTERNATIONAL AIRPORT
LOS ANGELES, CALIFORNIA
JANUARY 16, 1974

SYNOPSIS

About 0135 p.d.t. on January 16, 1974, the nose landing gear of Trans World Airlines, Inc., Flight 701, collapsed upon touchdown after a night visual approach to runway 6R at the Los Angeles International Airport. Of the 58 passengers and 7 crewmembers on board, 8 persons were injured. All injuries were incurred during the emergency evacuation. A postcrash fire destroyed the fuselage.

The National Transportation Safety Board determines that the probable cause of the accident was the continuation of a visual approach after the flightcrew lost outside visual reference because of a low cloud and fog encounter,

1. INVESTIGATION

1.1 History of the Flight

Trans World Airlines (TWA) Flight 701, a Boeing 707-131B, N757TW, was a scheduled, nonstop flight from John F. Kennedy International Airport, Jamaica, New York, to Los Angeles International Airport, Los Angeles, California.

The flight departed New York at 2025 1/ on January 15, 1974, with an instrument flight rules (IFR) clearance: Fifty-eight passengers and seven crewmembers were on board. The flight from New York to the Los Angeles area was routine.

At 0123 on January 16, Flight 701 was north of Pomona, California, and radio contact was established with Los Angeles Approach Control. The flightcrew reported leaving 12,000 feet 2/ for 10,000 feet and

1/ All times used herein are Pacific daylight time based on the 24-hour clock.

2/ All altitudes are mean sea level unless otherwise noted.

acknowledged receipt of the current weather information for the Los Angeles International Airport. This weather information, broadcast between 2308 on January 15, and 0127 on January 16, advised that the sky was partially obscured, visibility was 4 miles in haze and smoke, the wind was 340° at 3 kn, and that both instrument landing system (ILS) and visual approaches were being made to runways 6R and 7L.

At 0127, Flight 701 advised approach control that the airport was in sight. Approach control told the flight to cross the Santa Monica VOR 3/ at 8,000 feet or above, and cleared it for a visual approach to runway 6X.

American Airlines (AAL) Flight 293 was in the approach pattern immediately ahead of Flight 701, and had also been cleared for a visual approach to runway 6R. In a statement submitted to the Safety Board after the accident, the captain of AAL 293 said that the Los Angeles area was exceptionally clear and the visibility was virtually unlimited. He said that the airport lights were visible from 30 miles.

At 0128, while Flight 701 was still on approach control frequency, AAL 293 was inside the final approach fix of the ILS approach procedure for runway 6R, at an altitude of about 800 feet, and descending on the ILS glide slope. The Los Angeles local controller advised AAL 293 that some fog had just formed at the west end of the runway and that the flight should use caution. AAL 293 said he had the runway "pretty well in sight." When asked the extent of the fog, AAL 293 replied that there appeared to be more fog on runways 7L and 7R than on runways 6L and 6R. During an interview after the accident, the captain of AAL 293 said that shortly before he landed, he observed a thin scattered or broken deck of low clouds ahead and to the right of their approach path. At that time, the runway lights on the approach end of runway 6R began to appear dimmer. About 400 feet above the airport, the landing lights of the aircraft illuminated the top of the cloud layer. Consequently, he turned off the four landing lights to prevent glare. They entered what he described as a thin stratus layer about 200 feet above the airport, and although forward visibility was greatly reduced, visual contact with the runway was never lost. The stratus layer was about 50 to 60 feet thick. These observations were reported to the local controller upon landing.

At 0129, immediately after being advised by AAL 293 of the extent of the fog and cloud conditions at the west end of runways 7L and 6R, the local controller relayed the information to the approach controller. Flight 701 was not advised of these conditions.

At 0130, the approach controller cleared Flight 701, which was then 10 miles west of the airport, to turn inbound to runway 6R and to contact the tower local controller when it was inbound.

3/ VOR - Very High Frequency Omnidirectional Range.

X At 0133:10, TWA Flight 23, inbound behind Flight 701 for landing on runway 6R, reported to the local controller that he was on left base for runway 6R. The controller cleared TWA 23 to land, and advised that there was some fog at the west end of the runway.

X At 0133:30, Flight 701 advised the local controller that he was ahead of TWA 23. The controller cleared Flight 701 to land on runway 6R, and advised that the wind was variable, 300° at 5 kn and the runway visual range (RVR) for runway 6R was 5,500 feet.

- The flightcrew of Flight 701 said that they had been cleared for and were executing a visual approach to runway 6R. The first officer flew the aircraft from his normal position, while the captain handled the first officer's duties. The final checklist had been completed. The ILS approach frequency for runway 6R was tuned in for guidance; however, the approach was flown manually by visual reference to the runway and airport without flight director guidance. Descent began when the glide slope was intercepted, at which time the entire airport was clearly visible. ★

X The approach speed was determined by the flightcrew to be 136 kn, based upon a 50° flap configuration at the computed landing weight (184,000 lbs.). Only 40° of flaps were planned for the landing. At that flap setting, operational procedures specify that 5 to 10 kn be added to the approach speed.

X The captain said that at 500 feet he called out an airspeed of 160 kn and a sink rate of 800 to 1,000 feet per minute, and that he advised the first officer that the aircraft was slightly below the glide slope. The first officer initiated corrective action.

The flight engineer said that shortly after the captain's 500-foot callout, he noticed the first officer's glide slope indicator showing the aircraft one dot below the glide slope. He then called out "glide slope." The first officer corrected, and the flight engineer returned his attention to his panel. Later, the flight engineer turned to watch the last part of the approach and was surprised that the airport could not be seen. He observed that the first officer's glide slope indicator was moving to the top of the instrument, but before he could say anything the aircraft contacted the runway. He said that the aircraft rolled off the fog almost immediately, and that it "fishtailed;" that the captain had trouble getting the engines into reverse; and that Nos. 2 and 3 throttles could not be retarded to the idle position in order to apply reverse thrust. However, he noted that stopping did not seem to be a problem because braking was effective.

The captain stated that during the approach, the aircraft flew in and out of patches of low clouds. He said also, that just after they crossed the runway threshold, they entered a patch of shallow ground

fog, lost all outside visual reference, and immediately touched down on the runway.

The first officer stated that he was just about to flare the aircraft for landing when they encountered the fog and lost visual reference. He said he maintained the existing aircraft attitude until touchdown. Almost immediately after touchdown, the aircraft cleared the fog and continued down the center of the runway.

The three crewmembers stated that the touchdown seemed like a very firm 3-point landing; that is, the nose landing gear and the two main landing gears touched down on the runway simultaneously.

1.2 Injuries to Persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Others</u>
Fatal	0	0	0
Nonfatal	0	8	0
None	7	50	

1.3 Damage to Aircraft

The aircraft fuselage was destroyed by the postcrash fire. The empennage, both wings, the four engines, and the main landing gear were not damaged.

1.4 Other Damage

None

1.5 Crew Information

The crew of Flight 701 were certificated and trained for the flight, (See Appendix B.)

1.6 Aircraft Information

The aircraft was certificated, equipped, and maintained according to Federal Aviation Administration (FAA) requirements. (See Appendix C.)

1.7 Meteorological information

Partial surface weather observations for the Los Angeles International Airport were as follows:

0055 - Clear, visibility-4 miles, ground fog, smoke, temperature - 54° F, dew point-50° F., wind-220° at 4 kn, altimeter setting-

30.08 in runway 6 visual range-10-minute range-2,200 feet variable to more than 6,000 feet.

0146 - Special, partly obscured sky, visibility-3/4 mile, ground fog, smoke, temperature-52°F, wind-estimated 240° at 2 kn, altimeter setting-30.06 in. runway 6 visual range-10-minute range-less than 600 feet variable to more than 6,000 feet, runway 7 visual range-10-minute range-less than 600 feet variable to more than 6,000 feet, 1/10 of the sky obscured by fog, visibility west-2 miles.

The aviation terminal forecast for Los Angeles International Airport on January 15, valid from 2050 on January 15, 1974, to 1600 on January 16, 1974; was, in part, as follows:

2050-0300 partly obscured, visibility-3 miles in haze and smoke.

The RVR value provided to the flightcrew of Flight 701 just before landing was 5,500 feet. The RVR transmissometer is located so that both runways 6R and 6L are served. It is located 400 feet to the left of the centerline of runway 6R, and has a 250-foot baseline. The transmissometer receiver and projector are located 1,670 and 1,920 feet, respectively, beyond the threshold of runway 6R. The ILS touchdown point for runway 6R is 814 feet beyond the threshold. The official-in-charge of the National Weather Service at the airport stated that the clock time printed on the transmissometer record for runway 6R was about 3 minutes slow at the time of the accident. After the 3-minute error was corrected, the record showed that the transmissivity dropped rapidly after 0135. At 0138, it had dropped to less than 600 feet RVR, and it remained there until about 0230. The top of the fog layer was reported, by the crew of Flight 701 and 3 other flights, to be at 200 feet.

1.8 Aids to Navigation

A full ILS serves runway 6R at the Los Angeles International Airport. The glide slope angle is 3°. The navigational aids associated with the ILS for runway 6R were operational at the time of the accident.

1.9 Communications

No communication difficulties were encountered.

1.10 Aerodrome and Ground Facilities

Runway 6R at Los Angeles International Airport is 10,284 feet long and 150 feet wide. There is a displaced threshold of 331 feet on the west end of the runway, and a displaced threshold of 300 feet on the east end. The airport elevation is 126 feet, and the elevation at the approach end of runway 6R is 115 feet.

Runway 6R is equipped with high intensity runway lights, runway end identification lights (REIL), a medium intensity approach light system (MALs), and a runway alignment indicator light system. Vertical approach slope indicator (VASI) lights were not installed at the time of the approach of Flight 701. The approach light system was at Step 3 brightness. In that position, the MALs lights are on medium brightness, and the REIL's are at 26 percent maximum intensity. The MALs for runway 6R extends from the end of the runway westward 1,400 feet. The REIL's extend from the 1,400-foot location to 800 feet farther west, or 2,200 feet west of the approach end of runway 6R.

1.11 Flight Recorders

The aircraft, N757TW, was equipped with a Lockheed Aircraft Service, Inc., model 109-C, serial No. 124 flight data recorder (FDR), and a Fairchild, model A-100, serial No. 3165, cockpit voice recorder (CVR).

The foil recording medium of the FDR was undamaged and all parameters were recorded. According to the FDR, from 17 seconds to 9 seconds before touchdown, the aircraft's average rate of descent was 375 feet per minute and the indicated airspeed decreased from 157 kn to 150 kn. From 9 seconds before touchdown to touchdown, the average rate of descent was 1,400 feet per minute and the indicated airspeed decreased from 150 kn to 147 kn. Immediately following touchdown, the vertical acceleration, measured in g's, recorded a +4.60 g load, which was immediately followed by a recorded - 0.2 g load.

The CVR was damaged slightly by soot and heat, but no mechanical damage was noted. Since the CVR had ceased to operate during a training flight conducted on January 15, 1974, at St. Joseph, Missouri, subsequent flights (No. 700 and No. 701) were not recorded. Based on the Safety Board's examination, the CVR had malfunctioned because of a broken drivebelt. When a new drivebelt was installed, the CVR functioned properly.

The failure of the CVR should have been detected by the flightcrews of these flights when they checked the CVR before each flight. Federal Air Regulations require that the CVR be operational before an aircraft is released for flight.

1.12 Aircraft Wreckage

The longitudinal distance between the center of the main landing gear and the center of the nose landing gear is 52 feet 4 inches. The tire marks on the approach end of runway 6R disclosed that the aircraft's right main landing gear initially contacted the runway, 43 feet 5 inches beyond the threshold, and that the nose gear initially contacted the runway, 83 feet beyond the threshold. Tire marks on the runway also disclosed that the left nose gear tire flattened 5,322 feet beyond the

runway threshold. The aircraft stopped on the runway about 6,112 feet beyond the threshold and 15 feet to the left of the runway centerline.

The nose gear wheel well structure from fuselage station (FS) 312 to FS 360 was pushed aft and upward as a unit. The nose gear assembly remained intact and attached to the wheel well structure. The nose gear was in the extended and locked position. Numerous flat spots were evident on the nose gear tires. The tires had been subjected to intense heat.

Fire erupted in the lower 41 fuselage section, which is the lower electronic bay area located beneath the floor of the flight deck. The fire was not contained and eventually destroyed the interior of the cockpit and the passenger cabin.

The nose gear assembly trunnion supports and the drag brace support remained intact, attached to structure, and in their relative position within the wheel well unit structure. The nose gear wheel assembly penetrated the fuselage about 37 inches aft of FS 360. Air pressure was found in the nose gear strut assembly after the accident. No evidence of cracks was found on the outer surface of the nose gear strut assembly. Two fractured nose steering hydraulic lines were found in the aft upper left area of the nose wheel well.

The various engine control system cables located under the cockpit and cabin floors which are routed through structural members in that area were found in a partially jammed condition.

The rearward and upward movement of the nose landing gear pushed the passenger cabin floor upward, directly aft of the cockpit, in such a manner as to hold the cockpit door closed.

The four engines and associated cowling disclosed no evidence of external damage. Nos. 2 and 3 engines' aft pylon/trailing edges were buckled slightly.

The left and right major wing structure, aileron and tabs, spoilers, landing flaps, trailing edge cove lip doors, and wing tip surfaces were not damaged.

The right main gear strut was deflated. Examination of the shock strut disclosed that the strut internal piston rod's external lock nut had been forced upward against the trunnion, and the air charge had been allowed to leak from the strut cylinder.

1.13 Medical and Pathological Information

During the emergency evacuation, three passengers were injured seriously--two suffered fractured wrists and fractured ankles; the third

CONFUSION

suffered a fractured vertebrae. Five other passengers were injured slightly; their injuries included back strains and abrasions and contusions to their hands, knees, and elbows.

1.14 Fire

Witnesses stated that fog surrounded the aircraft and had spread to approximately 1,050 feet east of the runway shortly after the aircraft came to rest. After fog had enveloped the aircraft, fire was observed in the passenger cabin.

Several TWA employees who witnessed the accident, saw a small fire in the nose wheel area while the aircraft was still moving down the runway. They transported several small dry chemical fire extinguishers to the aircraft and attempted to put out the fire. The fire appeared to go out for a few seconds and then it reignited. One TWA employee noted a burning puddle of fluid, about 18 inches in diameter, directly under the collapsed nose gear.

Another TWA employee said that when the fire in the nose wheel tires was temporarily extinguished, he could still see flames inside the nose wheel area. Eventually the small portable fire extinguishers were exhausted, and the fire in the nose wheel area continued to spread before being extinguished by fire department personnel.

The Los Angeles Fire Department (Crash Company 80) arrived on the scene at 0136, 6 minutes after the accident. The company is located on the airport. The captain of Crash Company 80 said that when they arrived, an intense, bright fire was visible through a tear in the fuselage in the nose wheel area. Smoke was coming from the four open main exit doors, the four open emergency escape hatches over the wings, and the open cockpit windows. Purple-K-dry powder was directed with a handline into the nose wheel well area through the tear. The captain further stated that at this time fire erupted in the passenger cabin and cockpit areas, and spread down the entire fuselage. The fire was under control within 25 minutes.

★ Firefighting units and ambulances, which were called to assist Crash Company 80, encountered such dense fog that persons had to walk in front of the vehicles to guide them to the accident scene.

1.15 Survival Aspects

This was a survivable accident, and there were no fatalities.

When the aircraft was rolling on the runway, the flightcrew smelled smoke. When the aircraft stopped, the captain ordered an evacuation. Immediately thereafter, the first officer called the Los Angeles tower

controller and requested a fire truck. He thought this attempt was unsuccessful since he did not hear a side tone in his headset; however, the request was received by the local controller, and the fire department was notified.

The flight engineer attempted to open the cockpit door, but it was jammed closed by the buckled floor in the passenger cabin. Thereafter, the flightcrew exited via cockpit side windows using emergency evacuation ropes and could not assist the flight attendants in the evacuation of passengers. The evacuation alarm system was not used.

All four cabin door slides deployed properly. Passengers opened the four overwing emergency exits.

Except for one flight attendant, no other occupants of the aircraft are known to have used the left forward slide. Twenty-three persons, including two flight attendants, were reported to have departed the aircraft via the left rear slide. Fifteen persons, including a flight attendant and a deadheading crewmember, used the right forward slide, and about fifteen persons left via the right rear slide. Some passengers used the overwing exits, and did not know how they left the aircraft because of the smoke and darkness which reduced visibility within the cabin.

The eight injured passengers sustained their injuries during evacuation. Some of the passengers were injured by falling off the evacuation slides or contacting the ground too hard at the bottom of the slide. Others were injured when they jumped, fell, or were pushed off the wings by other passengers.

Flight attendants and passengers noted that the emergency lighting system functioned and there was sufficient lighting on all four slides. The aircraft was evacuated in 30 to 45 seconds.

1.16 Tests and Research

None.

1.17 Other Information

1.17.1 New Building for Fire Department

A new fire department building is proposed for the west end of the airport to supplement the existing fire department building on the east side. The new building will be located just south of runway 6/24. This station will have facilities for continuous standby. Until the new building is erected, one crash/fire vehicle and crew will be stationed south of the midpoint of runway 6R.

1.17.2 Airport Operating Procedures

Resolution No. 7467, adopted by the Board of Airport Commissioners, City of Los Angeles, California, on December 20, 1972, contains the following:

"There is hereby instituted effective April 29, 1973, a preferential runway use program. Between the hours of 11:00 p.m. to 6:00 a.m. (2300 - 0600) all aircraft approaching Los Angeles International Airport shall approach Los Angeles International Airport from west to east. During said hours no aircraft **not** certificated in accordance with Part 36 4/ of the Federal Aviation Regulations shall take off from Los Angeles International Airport from west to east. During said hours all take-offs shall be made on the inboard runways (25R and 24L) from east to west, and all landings from the west shall be made on runway 7L and 6R. In the event of landing minimums below those authorized for runways 7L and 6R, or in the event that the tail wind component parallel to said runways shall exceed 10 knots from the west, only aircraft certificated or flown in compliance with Part 36 of the Federal Aviation Regulations shall be permitted to land from east to west. Under the latter circumstances, all aircraft not meeting the requirements of Part 36 of the Federal Aviation Regulations shall be denied the right to land at Los Angeles International Airport during the hours first above mentioned."


2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The crewmembers were certificated and qualified for the flight.

The flight from New York to the Los Angeles area was routine.

The malfunction of the CVR was the only malfunction or failure of the aircraft of any of its systems. Except for the CVR, maintenance records indicate that the aircraft had been maintained according to FAA regulations and procedures.

 No ground navigational aids, approach lights, or runway lights, associated with an approach to runway 6R, failed or malfunctioned. Since the flightcrew was conducting a visual approach to runway 6R, the aircraft's navigation equipment was used only as a position cross-check.

Before the accident, two-way communications between the flight and air route control, approach control, and local control were satisfactory.

4/ Prescribes noise standards for the issue of type certificates, and changes to those certificates, and for the issue of certain standard category airworthiness certificates, for subsonic transport category airplanes, and for subsonic turbojet powered airplanes regardless of category.

Although the initial response by the airport-based fire department was satisfactory, the Safety Board believes that the response time of succeeding fire equipment was excessive. Therefore, the Safety Board considers the proposal to station standby equipment and crews on the airport in the vicinity of runway 6/24, a commendable one.

Evidence indicates that visibility at the touchdown point was severely restricted by smoke and dense fog and there was less than 600 feet RVR. The fog moved slowly eastward down the runway and reached the transmissometer about 3 minutes after the accident.

The transmissometer serving runway 6R measures a 250-foot segment of atmospheric transmissivity beginning 856 feet beyond the ILS touchdown point for that runway. This measurement point is not consistent with FAA transmissometer installation criteria. It is too far down the runway to measure the visibility at the glide slope touchdown point. The FAA defines RVR as "... the horizontal distance along a runway a pilot touching down can expect to see the high intensity runway lights." To obtain a representative measurement for the glide slope touchdown point, the transmissometer should be located adjacent to that point. Under nonhomogeneous fog conditions, the RVR may read lower than the actual visibility on the runway, and vice versa.

The ignition source of the fire is believed to have been the friction generated between the nose wheel tires and the runway surface. This was evident by the numerous flat spots found on the tires, and their burned condition. Fuel to sustain this fire is believed to have come from the two fractured nose wheel steering hydraulic lines located in the nose wheel well compartment. When the landing gear is in the extended position these lines contain pressurized hydraulic fluid capable of supporting combustion. Further, deposits of hydraulic fluid, which may have coated some of the hardware in the wheel well, once ignited, would have supported combustion.

The Safety Board believes that attempts to extinguish the wheel well area fire met with failure because firefighting personnel were unable to place the extinguishing agents directly on the source of the fire. This was because of the location of the fire within the nose wheel well area and the proximity of that area to the runway surface.

The preferential runway use program, instituted April 29, 1973, was in effect at the time of the accident. It required that Flight 701 approach and land from the west to the east. Otherwise, excluding an emergency, the flight would have been required to land at some other airport.

The preferential runway use program was established to relieve the surrounding communities from aircraft noise during nighttime hours. The program has been found to be in accordance with the criteria of established FAA operational procedures and the flightcrew's authority has not

been diminished in any way. If, in the opinion of the flightcrew, safety is derogated, they have the authority to, and should, refuse to initiate or continue an approach.

During the approach of Flight 701 the difference between the temperature and the dew point at the airport was from 2° to 4° , and the surface wind was from the southwest at 3 to 4 kn. Further, there is a relatively sharp rise in elevation, from sea level to 115 feet, at the approach end of runway 6R, which created some upslope cooling. A flightcrew familiar with the Los Angeles area should be aware of these potential fog-producing weather conditions, and be prepared to abandon an approach whenever outside visual references are lost.

Contrary to the crew's belief that all three landing gears touched down simultaneously, the tire marks on the runway confirm that the nose wheel touched down first. The 1,400-foot per minute rate of descent in the 9 seconds before touchdown, and the vertical acceleration trace reading of $+4.60g$ on the FDR upon touchdown, indicate an unchecked high sink rate and a resultant hard landing. The approach should have been discontinued under these conditions.

2.2 Conclusions

(a) Findings

1. All crewmembers were certificated and qualified for the flight.
2. The aircraft was certificated and maintained according to approved procedures.
3. There was no evidence of a preimpact malfunction or failure of the aircraft or any of its systems, other than the CVR.
4. The flight from New York to the Los Angeles area was routine.
5. While executing a night visual approach over water to runway 6R at the Los Angeles International Airport, the flight encountered ground fog when the crew prepared to flare the aircraft for landing.
6. The weather in the Los Angeles area was clear; however, the existing visibility at the approach end of runway 6R was considerably less than predicted by the National Weather Service because of fog.
7. The airplane touched down on the runway, nose wheel first, which resulted in a $t4.60$ vertical g load.

- a. The nose wheel collapsed rearward, and a fire started in the nose wheel well area.
9. The fire in the nose wheel well was initiated by the burning nose gear tires. The fire was fed by hydraulic fluid that escaped from broken nose wheel steering hydraulic lines.
10. Evacuation of the aircraft resulted in minor or serious injuries to eight passengers.
11. Firefighting personnel were unable to extinguish the fire in the nose wheel well before it spread to the fuselage and destroyed the cockpit and the passenger cabin.
12. The transmissometer serving runway 6R is located too far down the runway for its reading to be representative of the visibility which existed at the glide slope touchdown point.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the continuation of a visual approach after the flightcrew lost outside visual reference because of a low cloud and fog encounter.

3. RECOMMENDATIONS

The Safety Board on May 22, 1974, submitted Safety Recommendations A-74-45 through 52 to the Administrator, FAA. Copies of the recommendations and the Administrator's response are included in Appendix F.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

John H. Reed, Chairman, and William R. Haley, Member, were absent and did not participate in the adoption of this report.

August 14, 1974

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified of the accident at 0228, on January 16, 1974, by the FAA Communications Duty Officer, in Los Angeles, California. Investigators from the Board's Los Angeles and Washington offices conducted the investigation. Parties to the investigation were: The Federal Aviation Administration, Trans World Airlines, Inc., The Boeing Company, and the Air Line Pilots Association. The field phase of the investigation was completed on January 23, 1974.

2. Hearing

A public hearing was not held.

APPENDIX B

CREW INFORMATION

Captain William L. Schulz

Captain Schulz, 45, was employed by Trans World Airlines on November 24, 1952. He has Airline Transport Pilot Certificate No. 1169705. At the time of the accident, he had 15,800 flight-hours, of which 6,750 hours were in Boeing 707 aircraft. His latest First Class medical certificate was issued on December 11, 1973, with no limitations.

He flew 5 hours 20 minutes on this flight, and 5 hours 10 minutes in the 24-hour period before the flight. His last proficiency check was completed satisfactorily on October 31, 1973, and his last line check was given in July 1973.

First Officer Myron G. Jordon

First Officer Jordon, 31, was employed by Trans World Airlines on October 4, 1965. He has Commercial Pilot Certificate No. 1593609 with airplane single-engine land and instrument ratings. At the time of the accident, he had 4,335 flight-hours, of which 2,040 hours were in Boeing 707 aircraft. His latest First Class medical certificate was issued on July 27, 1973, with no limitations

He flew 5 hours 20 minutes on this flight, and 5 hours 10 minutes in the 24-hour period before the flight. His last proficiency check was completed satisfactorily in March 1973, and his last line check was given on July 8, 1973.

Flight Engineer Theodore F. Kyle, Jr.

Flight Engineer Kyle, 37, was employed by Trans World Airlines on August 5, 1966. He has Flight Engineer Certificate No. 1728190 for turbo-jet powered airplanes. He also has Commercial Pilot Certificate No. 1679261 with airplane single-engine land, sea, and instrument ratings. At the time of the accident he had 3,000 pilot flight-hours and 2,500 hours as a flight engineer. 1,800 hours had been accumulated in Boeing 707 aircraft. His latest First Class medical certificate was issued in December 1973, with no limitations.

He flew 5 hours 20 minutes on this flight, and 5 hours 10 minutes in the 24-hour period before the flight. His last proficiency check was completed satisfactorily on October 2, 1973, and his last line check was given in June 1973.

Flight Attendants

Flight Attendants Joanne Orgaralini, Patricia Peoples, Jill Cover, and Judy Conklin were all currently qualified in Boeing 707 aircraft.

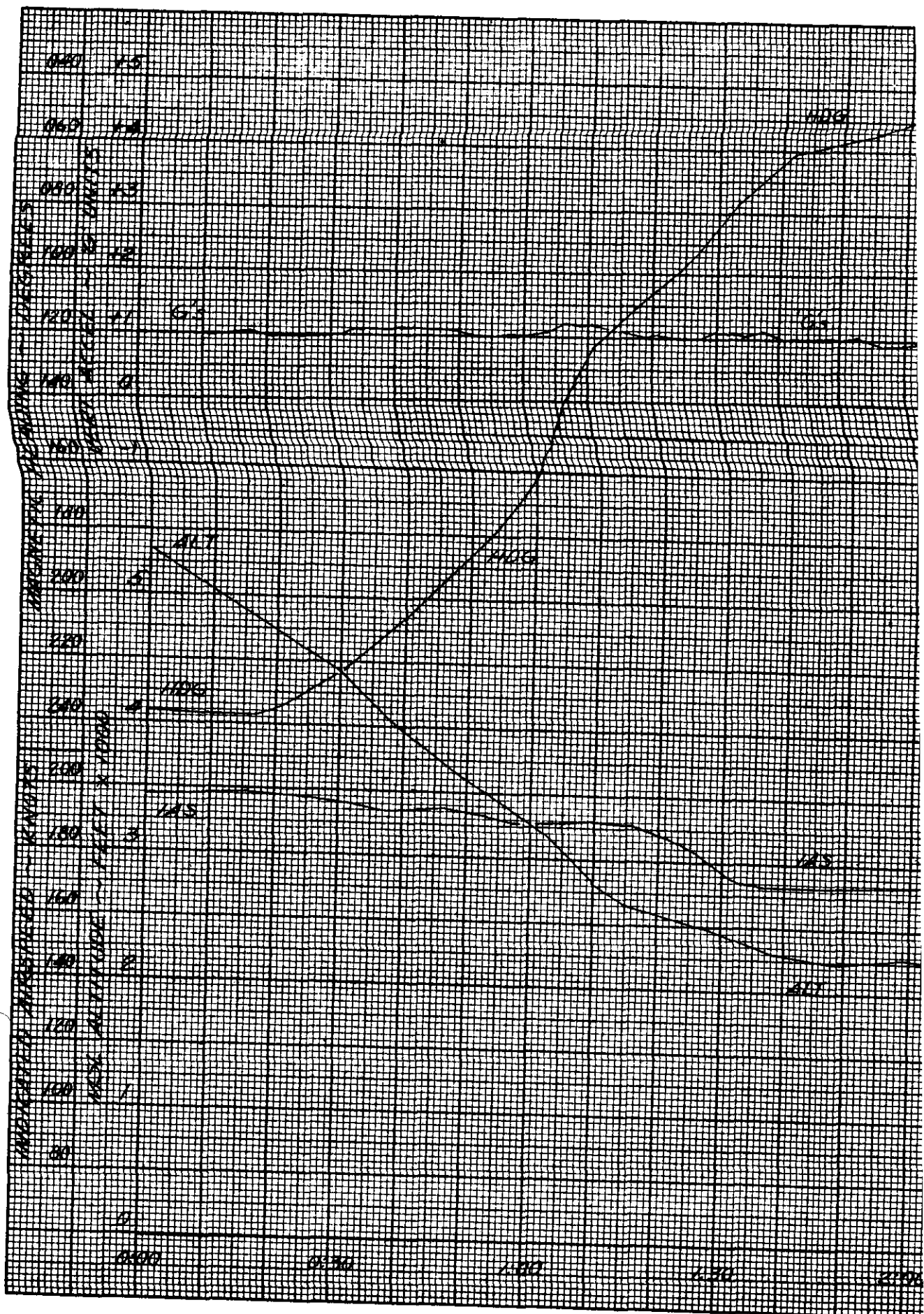
APPENDIX C

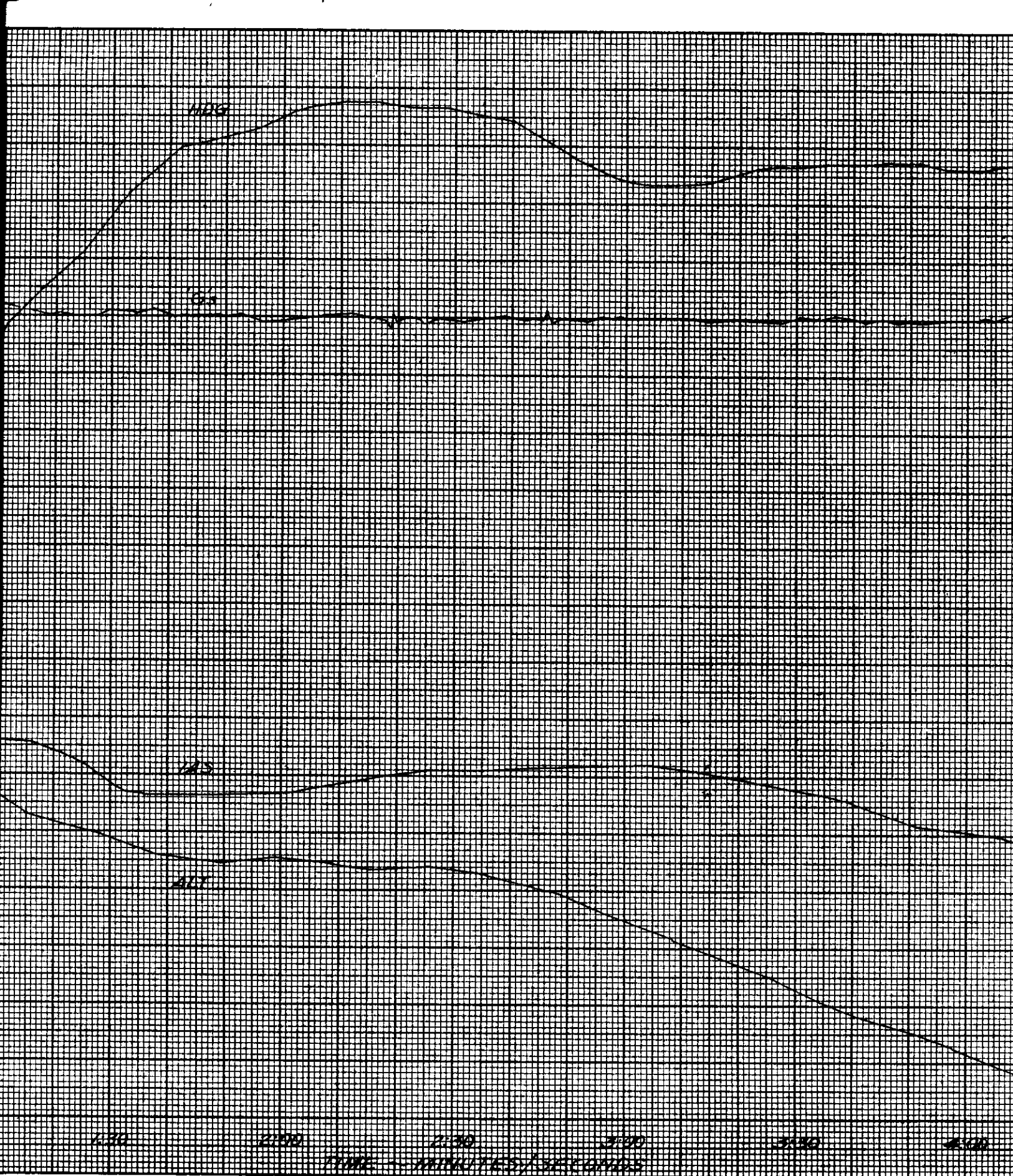
AIRCRAFT INFORMATION

Boeing 707-131B, Serial No. 18395, N757TW, was registered to Trans World Airlines. It was certificated and maintained according to procedures approved by the FAA. At the time of the accident, the aircraft had accumulated 38,876 flight-hours; it had been operated 14,886 flight-hours since its major inspection and 305 hours since its last line maintenance inspection.

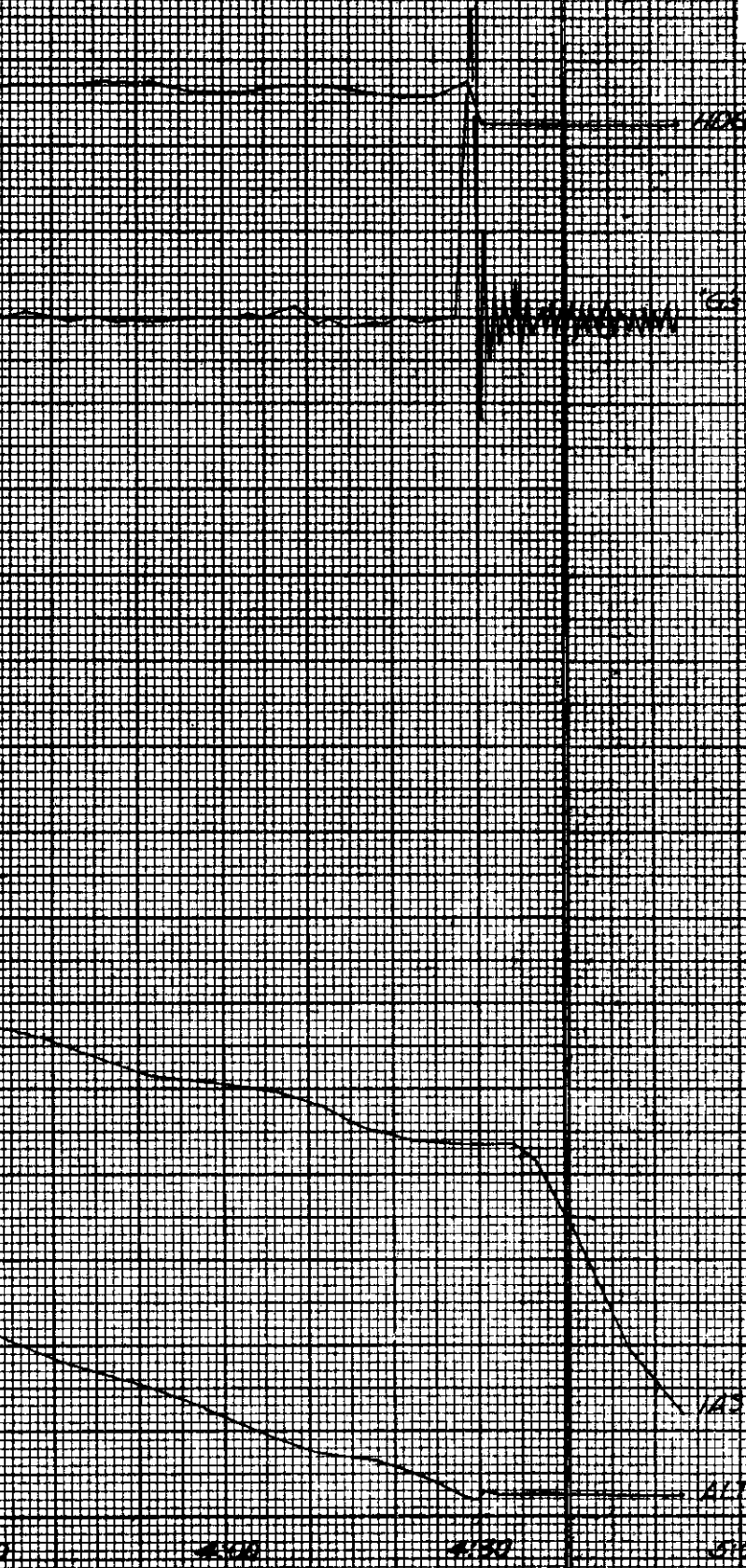
Pratt & Whitney JT-3D engines were installed as follows:

<u>Position</u>	<u>Serial No.</u>	<u>Total Time</u>	<u>Time Since Overhaul</u>
1	P667880BAB	20,395	20,395
2	P668491BAB	15,390	15,390
3	P668248BAB	14,509	14,509
4	P644653BAB	26,927	15,644





APPENDIX D



NATIONAL TRANSPORTATION SAFETY BOARD
BUREAU OF AVIATION SAFETY
WASHINGTON, D.C.

TWA CRASHING MICHIGAN 2700 ALT. IN FLIGHT TO
LOS ANGELES. CRASHING MICHIGAN 2700 ALT. IN
FLIGHT TO LOS ANGELES.

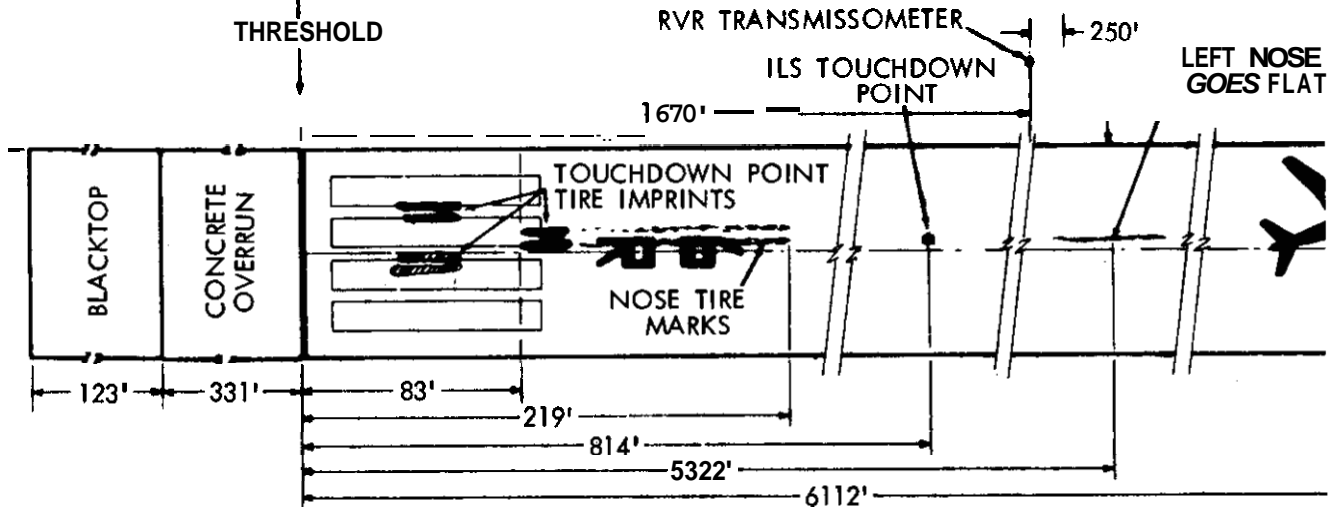
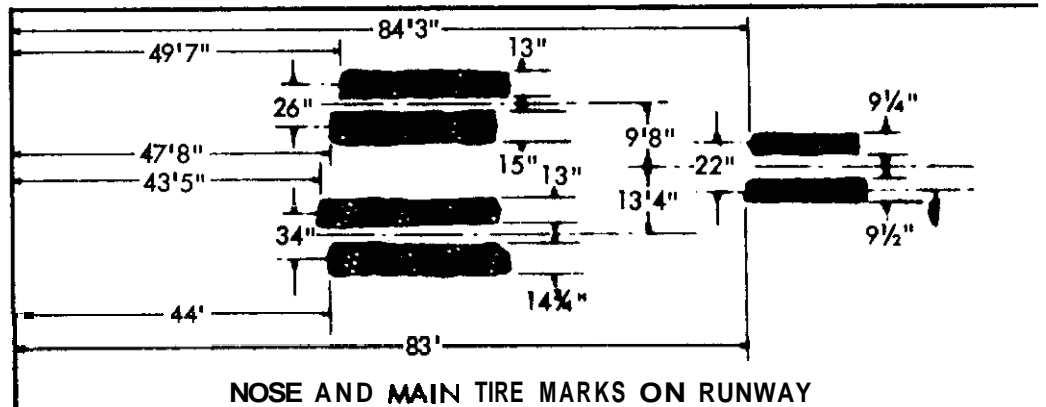
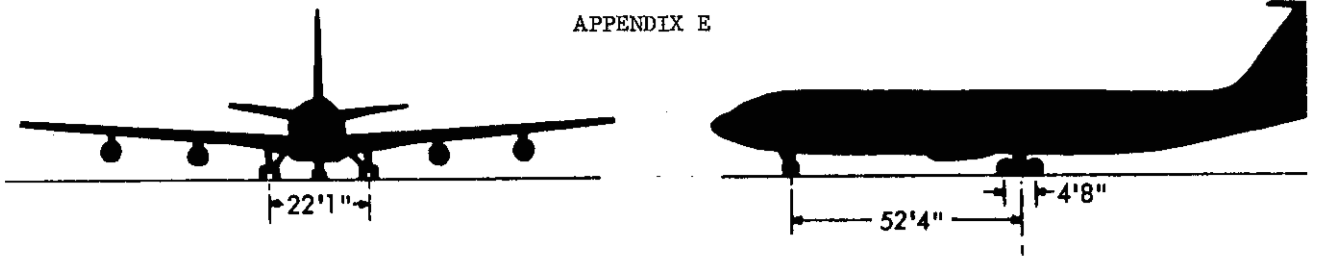
FLIGHT DATA RECORDED CRASH
LOS ANGELES 2700 ALT. IN FLIGHT TO
LOS ANGELES.

LAX 2700 ALT. IN FLIGHT TO
LOS ANGELES.

LOS ANGELES 2700 ALT. IN FLIGHT TO
LOS ANGELES.

LOS ANGELES 2700 ALT. IN FLIGHT TO
LOS ANGELES.

APPENDIX E



NATIONAL TRANSPORTATION SAFETY BOARD WASHINGTON, D.C.

APPENDIX F

ISSUED: May 22, 1974

Forwarded to:

Honorable Alexander P. Butterfield
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATION(S)

A-74-45 thru 52

On April 29, 1972, Los Angeles International Airport (LAX) instituted a preferential runway-use plan, which prohibits most aircraft operations east of the airport from 11:00 p.m. to 6:00 a.m. daily.

During these hours, aircraft which are not certificated under 14 CFR 36, must approach and land from west to east on inboard runways 6R or 7L. Aircraft taking off must do so to the west, via runways 24L or 25R. Those aircraft which comply with Part 36 may land to the west only when weather or wind conditions prohibit use of runways 6R or 7L. These aircraft may take off to the east only when weather or wind conditions make it necessary. When weather or wind conditions make it necessary to land to the west, aircraft not meeting the requirements of Part 36 are denied the right to land at Los Angeles International Airport.

The National Transportation Safety Board has received correspondence from the Allied Pilots Association and the Air Line Pilots Association, who claim that approaches during the curfew hours are dangerous and derogate safety. These groups contend that the plan makes it necessary for pilots to --

execute downwind approaches and landings, encounter opposing traffic flow, operate in fog which often forms over the western approaches during nighttime hours, and rely on nonstandard approach light systems.

Honorable Alexander P. Butterfield '(2)

The groups also contend ~~that~~ there is:

a lack of visual cues over the "black hole" of the Pacific, poor weather reporting during periods of nonhomogeneous fog conditions, and an absence of outer markers or locators which necessitates split navigation receivers at a time when the aircraft should be beginning a stabilized approach.

As a result of the above allegations and a TWA Boeing 707 accident at Los Angeles International Airport on January 16, 1974, the Safety Board investigated the "East Arrival" procedures.

Because of recent court decisions and the potential economic impact of existing and probable lawsuits, the Board of Airport Commissioners of the City of Los Angeles was forced to institute the "East Arrival" procedures. The program has been in operation for almost 1 year and the citizens of the communities involved remain opposed to approaches and landings to the west.

The procedures, as promulgated by the FAA, were found to be in accordance with established criteria. However, it was found ~~that~~ error-producing factors may exist in some areas, giving validity to some of the allegations.

The approach lighting system for runway 6R is nonstandard. The approach lights extend westward 1,400 feet from the approach end of the runway. The runway alignment indicator lights (RAILS--sequence flashers) extend 800 feet further for a total of 2,200 feet. The standard total length is 3,000 feet. In addition, the first RAIL (approaching from the west) is almost 70 feet below the other RAILS, which are located on top of the sand dune. The second RAIL is about 35 feet below the others. The approach lights for both runways are medium intensity.

A DME cochanneled with the 7L ILS frequency and located near the touchdown zone would allow both navigation receivers to be tuned to the ILS frequencies and would reduce the workload at a time when stabilization for the approach is desirable.

The 7L ILS glide slope is rough and autocoupled approaches are not authorized below 650 feet. The glide slopes of both 6R and 7L are unusable from the middle markers inbound. There are no VASI's on these runways to duplicate the electronic glide slopes over the "blackhole" approach. The VASI's would provide vertical guidance also during that segment of the approach which must be flown by relying upon visual cues. The Safety Board believes that the pilot needs vertical guidance until the runway threshold or runway lights are in sight. In Safety Recommendation A-72-145, (released September 5, 1972)

Honorable Alexander P. Butterfield (3)

the Safety Board recommended that the pilot monitor the flight instruments to that point. In response to that recommendation, the Administrator, FAA, agreed with our proposal, and stated further, "The need for this function does not cease when the runway is in sight. We believe that there is a need to continue monitoring the instruments in modern turbojet airplanes all the way into the flare."

At LAX, runways 6R and 7L instrument landing systems are unusable inbound from the middle markers. Furthermore, autocoupled approaches are not authorized below 650 feet m.s.l., on runway 7L because of glide slope roughness. Consequently, flight instrument monitoring would be futile. Here, the VASI's would give the needed guidance. In fact, the Safety Board considers VASI a valuable aid even when a glide slope is usable to touchdown. The Safety Board believes that the VASI can be a valuable supplement to any ILS approach, even under minimum weather conditions.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:


1. Raise the minimums for runways 6R and 7L approaches at Los Angeles International Airport to RVR 4,000 feet or 3/4 mile and the DH to 250 feet above touchdown zone elevation. (Safety Recommendation A-74-45.)
2. Increase both approach light systems to high intensity. (Safety Recommendation A-74-46.)
3. Install sequence flashers on 6R and 7L inbound from the RAILS to the 1,000-foot bar. (Safety Recommendation A-74-47.)
4. Install a DME near the touchdown zone of runway 7L, cochanneled on the ILS frequency of 111.1 MHz. (Safety Recommendation A-74-48.)
5. Remedy the roughness of the runway 7L glide slope. (Safety Recommendation A-74-49.)
6. Provide additional weather advisories and require additional weather observations whenever atmospheric conditions are conducive to fog formation or whenever nonhomogeneous fog conditions are present over the western approaches. (Safety Recommendation A-74-50.)

Honorable Alexander P. Butterfield (4)

7. Install VASI's on runways 6R and 7L. (Safety Recommendation A-74-51..)
8. Endeavor to obtain a 1-hour delay in the start of curfew on those nights when weather conditions are such that landings to the east cannot be made. This delay would allow about 30 percent of the landings scheduled during curfew hours to be made. In addition, the delay would partially alleviate the industry's problem of repositioning their aircraft for the following day's schedules. (Safety Recommendation A-74-52.)

Members of our Bureau of Aviation staff will be available for consultation in the above matters, if desired.

REED, Chairman, McADAMS, THAYER, BURGESS, and HALEY, Members, concurred in the above recommendations.


By: John H. Reed
Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590



OFFICE OF
THE ADMINISTRATOR

JUN 28 1974

Honorable John H. Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D. C. 20591

Dear Mr. Chairman:

Notation 1298

This is in response to Safety Recommendations A-74-45 thru 52. On June 9, 1974, the General Manager of the Los Angeles Department of Airports recommended to, and received approval from, the Los Angeles Airport Commissioners to break the curfew order (Resolution 7467) at Los Angeles International Airport and assume normal west flow operations whenever a 400-foot ceiling or RVR of less than 2400-foot exists and/or the wind from the west exceeds 10 knots. This change to the curfew order solves most of the problems mentioned in your recommendations, however, the answer to each specific recommendation follows.

Recommendation No. 1.

Raise the minimums for runways 6R and 7L approaches at Los Angeles International Airport to RVR 4,000 feet or 3/4 mile and the DH to 250 feet above touchdown zone elevation. (Safety Recommendation A-74-45.)

Comment.

We consider the present minimums for runways 6R and 7L, which were established in accordance with present criteria, to be satisfactory.

Recommendation No. 2.

Increase both approach light system to high intensity. (Safety Recommendation A-74-46.)

Comment.

There is no evidence that the MALSR/RAIL approach light system is inadequate. There has been a difference in the methods of controlling the light intensities. The controls for runways 6R and 7L approach lights were separated from the runway light system on January 17, 1974. The approach light intensities can now be varied independently of runway lights to accommodate varying visibility conditions.