

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. NTSB-AAR-74-4	2. Government Accession No.	3. Recipient's Catalog No. PB- 232 360	
4. Title and Subtitle Aircraft Accident Report - Texas International Airlines, Inc., CV-600, N94230, Mena, Arkansas, September 27, 1973		5. Report Date April 11, 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. 1267	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20591		13. Type of Report and Period Covered Aircraft Accident Report September 27, 1973	
		14. Sponsoring Agency Code	
15. Supplementary Notes This report does not contain aviation Safety Recommendations.			
16. Abstract At 2052, September 27, 1973, a Texas International Airlines, Inc., CV-600, N94230, crashed in the Cuachita Mountain Range, Arkansas. The accident occurred 80 nautical miles north-northwest of Texarkana and 8.5 nautical miles north-northwest of Mena, Arkansas. Eight passengers and three crewmembers were killed, and the aircraft was destroyed. The aircraft was making a round trip flight from Dallas, Texas, to Memphis, Tennessee, with intermediate stops at Texarkana, El Dorado, and Pine Bluff, Arkansas. The accident occurred during the westbound flight from El Dorado to Texarkana. The flight was conducted at night under visual flight rules. A cold front with associated thunderstorms and instrument meteorological conditions existed between El Dorado and Texarkana. The crew deviated about 100 nautical miles north of the direct course to their destination and attempted to operate the aircraft visually in instrument meteorological conditions. No radio transmissions were made by the crew after takeoff. The aircraft was found at 1730 c.d.t., on September 30, 1973. The National Transportation Safety Board determines that the probable cause of the accident was the captain's attempt to operate the flight under visual flight rules in night instrument meteorological conditions, without using all the navigational aids and information available to him; and his deviation from the preplanned route, without adequate position information. The carrier did not monitor and control adequately the actions of the flightcrew or the progress of the flight.			
17. Key Words VFR Flight Plan, Instrument Meteorological Flight Conditions, Visual Navigation, Thunderstorms, Search and Rescue, Night Flight, Dispatcher/Pilot Coordination, Flight Following, CV-600		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 40	22. Price \$3.25-1.45

NTSB Form 1765.2 (11/70)

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151



AIRCRAFT ACCIDENT REPORT

**TEXAS INTERNATIONAL AIRLINES, INC.
CONVAIR 600, N94230
MENA, ARKANSAS**

SEPTEMBER 27, 1973

ADOPTED APRIL 11, 1974

**NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D.C. 20591
REPORT NUMBER: NTSB-AAR-74-4**

TABLE OF CONTENTS

	<u>Page</u>
Synopsis	1
1. Investigation	2
1.1 History of the Flight	2
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	5
1.7 Meteorological Information	5
1.8 Aids to Navigation	8
1.9 Communications	8
1.10 Aerodrome and Ground Facilities	8
1.11 Flight Recorder	8
1.12 Wreckage	9
1.13 Medical and Pathological Information	10
1.14 Fire	10
1.15 Survival Aspects	10
1.16 Tests and Research	11
1.17 Other Pertinent Information	11
2. Analysis and Conclusions	13
2.1 Analysis	13
2.2 Conclusions	15
(a) Findings	15
(b) Probable Cause	16
3. Recommendations	17
 Appendices	
Appendix A - Investigation and Hearing	19
Appendix B - Airman Information	20
Appendix C - Aircraft History	22
Appendix D - Flightpath Chart	24
Appendix E - CVR Transcript	26

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591

AIRCRAFT ACCIDENT REPORT

Adopted: April 11, 1974

TEXAS INTERNATIONAL AIRLINES, INC.
CONVAIR 600, N94230
MENA, ARKANSAS
SEPTEMBER 27, 1973

SYNOPSIS

At 2052 c.d.t., on September 27, 1973, a Texas International Airlines, Inc., Convair 600, N94230, crashed into the north slope of Black Fork Mountain in the Ouachita Mountain Range in Arkansas. The eight passengers and three crewmembers on board were killed, and the aircraft was destroyed.

The flight was a scheduled air transport round trip flight from Dallas, Texas, to Memphis, Tennessee, with intermediate stops at Texarkana, El Dorado, and Pine Bluff, Arkansas. The accident occurred during the west bound flight from El Dorado to Texarkana, 80 nmi north-northwest of Texarkana, and 8.5 nmi north-northwest of Mena, Arkansas. The flight was conducted at night under visual flight rules. The crew did not activate the computer-stored instrument flight plan before departing El Dorado.

A cold front with thunderstorms and instrument meteorological conditions existed between El Dorado and Texarkana. The crew deviated about 100 nmi north of the direct course to their destination and attempted to operate the aircraft visually in instrument meteorological conditions. No radio transmissions were made by the crew after the flight departed El Dorado. At 2225 c.d.t., on September 27, 1973, civilian and military air and ground contingents commenced a search of parts of four States for the missing aircraft; the aircraft was located at 1730 c.d.t., on September 30, 1973.

The National Transportation Safety Board determines that the probable cause of the accident was the captain's attempt to operate the flight under visual flight rules in night instrument meteorological conditions without using all the navigational aids and information available to him; and his deviation from the preplanned route, without adequate position information. The carrier did not monitor and control adequately the actions of the flightcrew or the progress of the flight.

I. INVESTIGATION

1.1 History of the Flight

On September 27, 1973, Texas International Airlines, Inc., Convair 600, N94230, was operated as a regularly scheduled air transport passenger and cargo flight from Dallas, Texas, to Memphis, Tennessee, and return, with en route stops at Texarkana, El Dorado, and Pine Bluff, Arkansas. The return flight from Memphis to Dallas was designated Flight 655.

Flight 655 departed Memphis at 1842 1/. After a stop at Pine Bluff, the flight continued toward El Dorado; at 1951, the crew contacted the El Dorado Flight Service Station (FSS) and requested an airport advisory. The controller on duty advised the crew of the prevailing wind, altimeter setting, and traffic. He also told them that there were two pilots in the station who had been briefed on the weather toward the west and could supply Flight 655 with additional weather information. The crew replied that they were "painting a solid line about 50 miles west of El Dorado" but had not determined how they would get through the line. They requested that the pilots in the FSS meet and talk with them upon their arrival.

Flight 655 landed at El Dorado at 1953. The crew conferred with the waiting pilots and used the Convair's weather radar to examine the weather echoes west of El Dorado. The crew commented on what appeared to be a 15-mile-wide break in the line of weather echoes, near the 300° radial of the El Dorado VORTAC and about 35 miles west-northwest of the airport. The captain of Flight 655 did not indicate what route he intended to take to Texarkana.

The crew of Flight 655 did not report any aircraft discrepancies to the Texas International station agent nor inform him of their intended route to Texarkana.

The flight departed El Dorado at 2015. The captain did not activate the computer-stored instrument flight rules (IFR) 2/ flight

1/ All times herein, unless otherwise noted, are central daylight time, based on the 24-hour clock.

2/ To expedite traffic, scheduled airlines and some commercial operators preplan routes and file IFR flight plans with the Air Route Traffic Control Center (ARTCC) for the area. These plans are on-call and can be requested by a pilot before departure. The ARTCC will then activate the flight plan and issue a clearance with changes necessary for the prevailing traffic situation. Most aircraft operating on IFR flight plans are provided radar following and assistance, which would have been the case had Flight 655 activated its stored flight plan.

plan and did not file a flight plan. As Flight 655 taxied to runway 22, the crew contacted the FSS and stated that they were taxiing and would be proceeding under visual flight rules (VFR) to Texarkana.

Flight data recorder (FDR) traces indicate that after takeoff, the aircraft flew a magnetic heading of 290° and climbed to an altitude of 1,500 feet m.s.l. ^{3/}. The flight operated between altitudes of 1,500 feet and 3,000 feet until 2049:47. From that time until the time of impact at 2052:19, the aircraft's altitude varied between 2,200 feet and 2,025 feet.

After takeoff, the aircraft turned northwest and flew various headings until 2046:40. At that time, the heading trace indicated a turn toward the west. At 2051:45, the aircraft turned to 240°. This heading remained constant until impact, 34.8 seconds later. The turn toward the west began 100 nmi north of the direct course between El Dorado and Texarkana.

Recorded airspeeds throughout the flight ranged from 228 knots to 160 knots. Impact occurred at 188 knots.

The IFR minimum en route altitudes (MEA) for Flight 655's route vary from 2,200 feet at El Dorado to 4,500 feet near the crash site.

Cockpit voice recorder (CVR) transcripts indicate that the crew did not attempt to contact ground facilities after takeoff from El Dorado. The transcripts also indicate that the first officer was flying the aircraft and that the captain was giving heading and altitude orders to the first officer. Correlation between the FDR and the CVR shows that the headings and altitudes flown by the first officer corresponded to those requested by the captain.

The CVR recording reflects the crew's attempts either to circumnavigate or to penetrate the weather, while trying to conduct the flight according to VFR.

As the flight progressed, the first officer expressed concern about the flight's position relative to the elevation of the terrain. The recording also reveals that, at times, the flight operated in instrument meteorological conditions (IMC), and that the aircraft's radarscope depicted ground returns and precipitation echoes.

About 12 minutes before impact, the first officer stated, "I sure wish I knew where . . . we were." A few minutes later he stated, "Paintin' ridges and everything else boss, and I'm not familiar with the terrain."

^{3/} All altitudes and elevations are mean sea level, unless otherwise indicated.

Two minutes and 40 seconds before impact and after the captain's ordered descent to 2,000 feet, the first officer said, "I'll be Man, I wish I knew where we were so we'd have some idea of the general . . . terrain around this . . . place." The captain told the first officer that the highest point in the area was "twelve hundred" feet and that they were not near that point.

About 14 seconds before impact, the first officer mentioned that they were about to pass over Page VORTAC. Six seconds later the captain said that the heading to Texarkana was 180°. The first officer said that it was 152°.

At 2052:17, the first officer said, "Minimum en route altitude here is forty-four hun" His statement was terminated by the sound of the crash.

The aircraft crashed into the steep, heavily wooded, north slope of Black Fork Mountain in the Ouachita Mountain Range. Impact occurred at an elevation of 2,025 feet and about 600 feet below the top of the ridge.

The accident occurred at night at 34°42'5" N. latitude and 94°20' W. longitude.

1.2 Injuries to Persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Other</u>
Fatal	3	8	0
Nonfatal	0	0	0
None	0	0	0

1.3 Damage to Aircraft

The aircraft was destroyed.

1.4 Other Damage

None

1.5 Crew Information

The captain and the first officer were certificated for their respective duties according to regulations. They had received the training required by their company and by the regulations of the Federal Aviation Administration (FAA). (See Appendix B.)

1.6 Aircraft Information

The aircraft was owned and operated by Texas International Airlines, Inc. It was certificated, equipped, and maintained according to FAA and company regulations. The weight and center of gravity were calculated to be within prescribed limits at takeoff and at the time of the accident. The aircraft did not have an emergency locator transmitter, nor was one required. (See Appendix C.)

1.7 Meteorological Information

The current and forecasted weather information was available to the flightcrew members before they departed Memphis. The company agent at El Dorado gave the crewmembers the pertinent 1900 aviation weather sequences before they departed.

The accident occurred near the north end of a broken line of thunderstorms that were associated with a cold front which extended in a north-south direction across Flight 655's proposed route. Surface weather charts showed a cold front which extended from southeastern Kansas and eastern Oklahoma, southward along a line near Texarkana and Shreveport, then into southeastern Texas and the Gulf of Mexico.

Following are selected official aviation surface weather observations:

El Dorado

- 1955 - Estimated 25,000 feet broken, visibility-7 miles, temperature-78° F., dew point 75° F., wind calm, altimeter setting-30.05 in.
- 2054 - 25,000 thin broken, visibility-7 miles, temperature-76° F., dew point-74° F., wind calm, altimeter setting-30.06. Lighting in clouds distant-southwest.

Texarkana

- 1954 - Record Special; 2,000 scattered, estimated 4,000 overcast, visibility-7 miles, thunderstorm, light rain showers, temperature-73° F., dew point-70° F., wind-120° at 10 knots, altimeter setting - 30.05. Thunder began 1943, southwest, moving northeast. Frequent lightning in clouds and cloud to ground, all quadrants. Peak wind-130° at 35 knots, gusts to 48 knots.
- 2017 - Special; 500 scattered, measured 2,000 overcast, visibility-7 miles. Thunderstorm northeast, moving north-

east. Frequent lightning in clouds and cloud to ground northwest to northeast to east.

2051 - Record Special estimated 2,000 broken, 10,000 overcast, visibility-7 miles, very light rain showers, temperature-73° F., dew point-70° F., wind-210° at 3 knots, altimeter setting- 30.04. Thunderstorm ended 2051, moved northeast. Occasional lightning in clouds, northeast-south. Peak wind-180° at 15 knots, gusts to 35 knots.

A weather radarscope photograph taken at Little Rock, Arkansas, 4/ about the time of the accident showed an extensive area of weather echoes from about 100 miles west-northwest of Little Rock, to the vicinity of Texarkana, and then south-southeast. The 2034 radar report from Little Rock indicated that the area contained thunderstorms with heavy rain showers and cells which were moving from 230° at 15 knots and maximum tops of detectable moisture at 35,000 feet.

Flight 655's proposed route from El Dorado to Dallas via Texarkana was through areas for which forecast responsibility was assigned to Weather Service Forecast offices in New Orleans, Louisiana (for Arkansas) and Fort Worth, Texas (for Texas). Following are excerpts from the aviation area forecast issued by the New Orleans office at 1340 on September 27, which was valid for a 12-hour period beginning at 1400.

"Heights above sea level unless noted. Weak ridge with moist unstable air over area. Cold front approaching from west and northwest expected to enter extreme northwest Arkansas by 0100. Arkansas and Tennessee - Ceiling 1,500 - 2,500 broken, tops 10,000, 25,000 broken variable to overcast with scattered ceilings 500 overcast, 1 mile in showers and thunderstorms, tops 50,000. Thunderstorms occasionally in short lines or clusters, more numerous over coastal waters, along coast and about 150 miles inland. Moving northward at about 15 knots. Moderate to severe turbulence all levels in or near thunderstorms."

At 1800, on September 27, the Weather Service Forecast Office at New Orleans issued the following SIGMET 5/, valid from 1800 to 2200:

4/ The WSR-57 radar weather equipment at Little Rock was the most powerful equipment in the area and nearest to the accident site.

5/ A SIGMET is an advisory warning of weather severe enough to be potentially hazardous to all aircraft. It is broadcast on navigational aid voice frequencies and by flight service stations. It is also transmitted on service A teletype circuits.

"SIGMET ALFA 1 - Flight precautions. Over western Arkansas, northern Louisiana and southeast Mississippi for a broken line thunderstorms 15 miles wide with tops to 45,000 extending from Fayetteville, Arkansas, to near Shreveport, Louisiana, to near McComb, Mississippi. Southern portion line moving northward at 10 knots and western portion moving eastward at 10 knots. Cancel SIGMET at 2200 and see New Orleans area forecast to be issued at 1940."

The following information was contained in the terminal forecast for Texarkana issued by the Weather Service office at Little Rock at 1740 on September 27, valid for a 12-hour period beginning at 1800:

1800 - 2200 - Ceiling 2,500 broken, 30,000 overcast, visibility-6 miles, haze. Broken clouds variable to scattered. A chance of moderate rain showers and thunderstorms with moderate rain showers.

Pilot weather reports pertinent to the time and place of the accident were not available.

While Flight 655 was northwestbound from El Dorado, a corporate flight, eastbound from Dallas to Memphis on an IFR flight plan, deviated south of Texarkana to avoid areas of "significant" weather. The pilot stated that after he had passed Quitman VORTAC (75 nmi southwest of Texarkana), his radar had displayed precipitation returns. He also stated:

"The barometric pressure was extremely unstable causing fluctuations in altimeter readings and rapid pitch changes on altitude hold. Only light turbulence was encountered at this time. Shortly thereafter, a number of very well defined cells began to show to the north of and across our course in a line extending to a position 20° to the right of course. In the meantime, the rain return immediately in front of us receded behind. Just prior to penetrating any cells, lightning was visible in all quadrants, but no return showed. As I recall, cell genesis was more rapid than I have ever seen it before in 30 years of flying. ATC gave permission for any deviations necessary. All of these were to the right of course with the final heading being 85° to the right of course. We passed beyond the weather when 23 DME miles southeast of Texarkana."

The pilots who had consulted with the crew of Flight 655 at El Dorado subsequently requested and received a clearance to fly around the weather, to the south. The pilot said that on the southern route they encountered ". . . little more than light precipitation and very light turbulence but with much lightning on either side of us."

Portions of the winds aloft observations from the 1900 rawinsonde ascents at Little Rock, Arkansas, and Shreveport, Louisiana, were:

<u>Height (Feet - m.s.l.)</u>	<u>Direction (True)</u>	<u>Velocity (kn)</u>
<u>Little Rock</u>		
Surface	110°	10
1,000	110°	11
2,000	115°	11
3,000	120°	10
<u>Shreveport</u>		
Surface	130°	6
1,000	135°	12
2,000	140°	14
3,000	150°	15

Winds aloft reports were not available for Texarkana or Fort Smith, Arkansas. The accident occurred during the hours of darkness.

1.8 Aids to Navigation

Seven VORTACS and five radio beacons were available to Flight 655 along its route from El Dorado to the crash site. The area in which the accident occurred was under the jurisdiction of Fort Worth ARTCC, and radar service was available upon request.

Page VORTAC, about 13.5 miles west of the accident site, has a code identification followed by a voice identification and a warning: "Page VOR Caution, elevation 2,700 feet." This warning had been transmitted by the VOR for about 1 year. A special flight check of the Page VORTAC was conducted after the accident. It functioned properly. McAlester FSS monitors the Page VORTAC 24 hours a day. On September 27, no malfunctions of the VORTAC were reported.

No malfunctions of any navigational aids available near the flight-path of Flight 655 were reported.

1.9 Communications

No air-to-ground communications were attempted during the flight.

1.10 Aerodrome and Ground Facilities

Not applicable.

1.11 Flight Recorders

The airplane was equipped with a flight data recorder (FDR) and a cockpit voice recorder (CVR), both of which were found in good condition.

The recorders were installed in the aft section of the aircraft. There was no evidence that either had been exposed to fire, heat, or smoke.

Flight Data Recorder

The FDR was a Fairchild Model F-5424, Serial No. 1991. Its tape was examined, and a readout was made of the flight from El Dorado to the end of the recorded traces--a total of 37:19.8 minutes. The altitude data were corrected for a barometric pressure of 30.06 in. Hg to convert the recorded pressure altitude to mean sea level. No other parameters were corrected. These data were combined into a flight track chart. (See Appendix D.)

Cockpit Voice Recorder

The CVR was a Fairchild Model A-100, Serial No. 1334. The entire tape, which recorded 34 minutes of the flight, was transcribed. (See Appendix E.)

1.12 Wreckage

The aircraft struck trees and the rocky mountainside in a level flight attitude, on a heading of 240° magnetic, and at an altitude of about 2,025 feet. The slope of the mountain at the point of impact is approximately 45°. The aircraft disintegrated.

Examination of the wreckage did not reveal evidence of in-flight structural failure, fire, or explosion. There was no evidence that lightning struck the aircraft. Fire damage was confined to the engine nacelles and the center fuselage section.

The wreckage area was 120 feet wide and 175 feet long. All pieces of the aircraft were recovered from this area.

All flight controls were found in the wreckage area. All trim and flight tabs were attached to their respective surfaces, and the push-pull rods were connected to the tabs. Tab positions were not considered valid because of damage. The landing gear and the landing flaps were in the "up" position.

There was no evidence of in-flight malfunction or failure of the aircraft systems.

Both VOR receivers were damaged. The selected frequency of the No. 1 VOR receiver was 116.3 MHz, the Texarkana VORTAC frequency. The distance measurement equipment (DME) was on channel 110. The DME was channeled through the No. 1 VOR selector. Channel 110 is paired with the Texarkana VORTAC frequency. The No. 2 VOR receiver's selected frequency was between 113.6 and 113.7 MHz. The Page VORTAC frequency is 113.5 MHz.

The VOR receiver control panel was damaged. The selected frequency on the No. 1 VOR control head was between 116.2 and 116.3 MHz, and the frequency selected for the No. 2 VOR control head was between 113.8 and 113.9 MHz. The DME function switch was in the "receive" position.

Both automatic direction-finding receivers were damaged. The No. 1 receiver was set on a frequency of 268 kHz, and the No. 2 receiver, on a frequency of 270 kHz.

Other navigation and communication equipment that was recovered was damaged severely. Valid information could be obtained only from the No. 1 VIF transceiver. The selected frequency was 129.8 MHz, one of the company's frequencies.

Although portions of some instruments were recovered, they were damaged so extensively that valid information could not be obtained from them.

The engine nacelles and engines separated from the aircraft structure and the propellers showed evidence of rotational damage. There was no evidence of distress or malfunction of the powerplants in flight.

1.13 Medical and Pathological Information

Post mortem and toxicological examinations were performed on the crew and the passengers. All the deceased had suffered multiple, extreme, and traumatic injuries. The autopsies and toxicological examinations of the pilots revealed no evidence of preexisting abnormality.

1.14 Fire

There was no evidence of an in-flight fire or explosion. Although it was raining at the time of impact, some ground fires broke out after the fuel tanks ruptured and spilled fuel down the mountainside. The fire burned out before the aircraft was found.

1.15 Survival Aspects

The accident was not survivable, because of the structural deformation and the disintegration of the fuselage. Longitudinal forces at impact were calculated by the FAA's Civil Aeromedical Institute personnel to be in excess of 600 mean g. A crashworthiness study of the seats and associated equipment could not be conducted.

At 2225, after Flight 655 was considered "missing," civilian and military personnel initiated a search for the aircraft. The search was conducted both in the air and on the ground and was coordinated by the Arkansas Civil Air Patrol and the 43rd Aerospace Rescue and Recovery Squadron. Four hundred and seventy-eight sorties and 1,235.4 hours were

flown by 22½ aircraft. Sixty-two personnel formed ground search teams, and 93 ground vehicles were used in the search. The aircraft was found at 1750 on September 30, 1973 --3 days after the crash.

En route to the search area, an Arkansas Army National Guard helicopter crashed, killing the three crewmembers.

During the search the Safety Board was informed that at 2010, on September 27, a controller at the Fort Worth ARTCC saw a VFR target on his radarscope, about 15 nmi northwest of El Dorado. The controller watched the target because it could have conflicted with IFR traffic in the area. He stated later:

" . . . I continued to observe this 1200 (the target) thinking that the pilot might request assistance due to weather. Later the VFR target turned north-northwest and proceeded near Hope, Arkansas. When the VFR target was observed to be approximately 30 miles east of the Page, Oklahoma, VORTAC and approximately 10 nmi south of the Ft. Worth and Memphis Center boundary, I stopped watching the target."

When this information was received by the search coordinator, aircraft were dispatched to search the area where they found the aircraft wreckage.

After the aircraft wreckage was located, Aerospace Rescue and Recovery Squadron pararescuemen were lowered to the wreckage from a helicopter. They found no survivors.

1.16 Tests and Research

None

1.17 Other Pertinent Information

(a) Company Procedures

Texas International Airlines personnel must comply with the following requirements which are contained in either the company's flight operations manual, the CV-600 operating manual, the company's training manual, or the carrier's operating specifications.

1. CV-600 Recurrent Training

Each Texas International Airlines pilot is required to complete a 16-hour ground school course every 12 months. Subjects taught include operating limitations, weather, and review of the flight manual and operations manual.

2. Flight Operations Manual

The manual specifies procedures to be followed when turbulence, thunderstorms, and hail are forecasted or encountered. The manual also emphasizes the responsibilities for system control during thunderstorm conditions, on-time performance, position reporting, and dispatch procedures.

With reference to procedures to be followed when thunderstorms are encountered, the manual stated,

"The Captain should attempt to avoid areas of turbulence when possible. While a certain amount of flying must, of necessity, be conducted in turbulent air, the effects may often be minimized by careful selection of flight path. Pilots should avoid:

- (1) Flying in or near thunderstorms, unless unavoidable.
- (2) flying at low altitudes over mountain ridges, or adjacent to the lee side of mountains during windy conditions.
- (3) using a route where turbulence is probable when a better alternate route is available."

A section of the CV-600's operations manual which outlines system control during thunderstorm conditions stated:

"Thunderstorms are probably the most dangerous situation the airlines face at this time. Extreme caution shall be exercised in the control and operations of flights when thunderstorms are observed, reported or forecast."

The manual emphasizes the need to keep up to date on the weather by using radar plots, maps, pilot reports, and all other available means. The manual also states that when there is a solid line of thunderstorms, it is best to wait on the ground for the line to pass or dissipate.

Some of the requirements for reporting position were:

"PX Reports to Company

Procedures outlined here shall apply to all scheduled flights, including extra sections, training, ferry and test flights. These flights will report off times and will make other reports to the company as are deemed necessary or advisable by the captain and the dispatcher considering the existing flight conditions and the flight maneuvers being conducted.

"Reporting Change of Route

When a flight deviates from flight planned route, due to thunderstorm, icing, turbulence, etc., Flight Control shall be advised of the different route as soon as practical. This requirement shall not apply when the different routing results from ATC vectors and control. All flights are to maintain a continuous listening watch whenever possible."

3. Operations Specifications

The company's operation specifications authorize the airline to operate its prop-jet flights according to visual flight rules.

(b) Federal Aviation Regulations (FAR)

FAR 121.533 (Responsibility for Operational Control: Domestic Air Carriers) gives the pilot-in-command and the aircraft dispatcher joint responsibility for the preflight planning, delay, and dispatch release of a flight. The dispatcher is required to follow the progress of each flight, issue necessary information for the safety of the flight, and cancel or redispach a flight, if, in his opinion or in the opinion of the pilot-in-command, the flight cannot operate or continue to operate safely as planned or released.

The FAR states that during the flight each pilot-in-command is in command of the aircraft and crew and is responsible for the safety of the passengers, crewmembers, cargo, and airplane.

The crew of Flight 655 did not contact the company agent at El Dorado, either on the ground or after departing El Dorado. In addition, the captain did not inform the company agent that he had decided to proceed to Texarkana VFR rather than activate the computer-stored IFR flight plan. Also, he did not inform the company agent that he planned to deviate from the direct flight track between El Dorado and Texarkana. The crew had previously operated VFR from Memphis and Pine Bluff without notifying company agents. Failure to report these deviations violated both company and FAA regulations. The dispatcher did not attempt to ascertain the status of Flight 655 from El Dorado, until it was 23 minutes overdue at Texarkana.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The aircraft's powerplants, airframe, systems, and flight controls were not factors in the accident. The ground aids and navigational facilities pertinent to the flight operated within prescribed limitations.

There was no evidence of pilot incapacitation. Accurate weather forecasts and reports were available to the crew of Flight 655.

The captain's operational control and conduct of the flight were major factors in the accident.

The captain deviated from the approved dispatch release without notifying the dispatcher of his decision to do so. The flight was originally dispatched as an IFR flight, but the captain decided to fly three segments of the flight VFR. During the trip from El Dorado to Texarkana, the captain apparently believed that he could get through the front which lay across his intended flightpath by flying VFR through the break in the line of storms that he observed on the aircraft radar. Therefore, he continued flight in instrument meteorological conditions (IMC).

Before arriving at El Dorado, the crew of Flight 655 was aware of the thunderstorm activity which extended across the proposed route to Texarkana. The crew's concern about the weather was apparent when they used the aircraft's radar to view the weather west of El Dorado. In addition, they discussed the weather situation with the pilots at El Dorado.

The CVR indicates that the captain chose to divert the flight to the north in order to find a way through the line of thunderstorms. As the flight proceeded in a northwesterly direction, the pilots discovered that they would not be able to circumnavigate the northern end of the line of thunderstorms. The captain finally directed the first officer to fly various westerly headings in an apparent effort to find a way through the storm area. (See Appendix D.)

The crew attempted to keep track of their position, but their actions were intermittent and imprecise. Although the crew apparently established several lines of position, there is no evidence that they took cross bearings to establish an exact position. Their conversation indicates that the captain had a general idea of the aircraft's position but did not have precise information that he could use to determine its position in relation to the terrain.

The crew devoted considerable time and attention to the weather, observing it both visually and on the weather radar. There is no evidence that the captain kept track of the time flown or that he kept a lead reckoning position and related it to minimum en route altitude or terrain height.

The first officer made a number of comments that indicated his concern about the aircraft's position, the lack of information on terrain elevation, and the weather through which he was flying. Near the end of the flight, he apparently referred to an en route navigational chart. He stated that he believed the flight was near the Page VORTAC. While the first officer was warning the captain about the minimum en route altitude

in the area, the aircraft struck the mountain. The crew apparently tuned the navigational radios to various frequencies but did not identify the stations aurally. Had the Page VORTAC been identified aurally, the crew would have been alerted that they were approaching the station at an altitude that was below the elevation of the station.

The CVR tape confirms that the aircraft penetrated clouds and frequent rain showers as it flew its northwesterly course.

The captain should have known that he was in the jurisdictional area of Fort Worth ARTCC and that radar assistance was available. However, he did not attempt to establish radio contact either with the company or with air route traffic control; nor did he air file an IFR flight plan with the attendant radar services.

The flight deviated about 100 nmi north of its course before it established a track, first, toward the west and then, southwest toward Texarkana. At that time, the aircraft was flying in the Ouachita Mountain Range in which some elevations exceed 2,600 feet. Minimum en route IFR altitudes in that area are 4,400 and 4,500 feet.

The Little Rock weather radarscope photograph which was taken near the time of the accident indicates that Flight 655 had penetrated, or was about to penetrate, the northern edge of a broken line of heavy thunderstorm activity. The turn to a southerly heading put the aircraft on a direct line into the worst part of the thunderstorm activity. A westerly heading would have taken the aircraft into a clear area 10 to 20 miles away. Since the aircraft was flying low, the weather echoes would have been partly masked by ground returns. In addition, depending on the tilt of the antenna, the aircraft's radarscope penetration would have been confusing. The ridges and mountains also might have interfered with the reception of VOR signals.

The Board believes that at the time of the accident, the aircraft was in DMC and in rain showers associated with the nearby thunderstorms.

The Board could not determine the reasons for the captain's departure from established procedures.

2.2 Conclusions

(a) Findings

1. The crew was trained, qualified, and certificated according to regulations.
2. The aircraft was certificated, equipped, and maintained according to regulations.

3. There was no in-flight failure or malfunction of the structure, powerplants, systems, or other aircraft components.
4. Post mortem examinations of the crew members revealed no evidence of a physiological condition that would have affected their performances.
5. The crew possessed both current and forecast weather information before they departed El Dorado.
6. The captain did not inform the dispatcher of his intentions to deviate from the flight plan, nor coordinate the deviations with him.
7. The dispatcher did not monitor the conduct of the flight.
8. Flight 655 deviated about 100 nmi north of the direct course to its destination.
9. Flight 655 was operated VFR into instrument meteorological conditions, without an IFR clearance.
10. The crewmembers did not use all available navigational equipment and aids to determine their position and select a safe flight altitude.
11. The captain, without adequate knowledge of the terrain, directed the flight to descend to an altitude which was below terrain elevation.
12. There was no evidence that the captain was concerned about his position or track over the ground.
13. The accident occurred while the aircraft was flying straight and level, under cruise power. The crew was not aware of the impending impact with the terrain.

(b) Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was the captain's attempt to operate the flight under visual flight rules in night instrument meteorological conditions without using all the navigational aids and information available to him; and his deviation from the preplanned route, without adequate position information. The carrier did not monitor and control adequately the actions of the flightcrew or the progress of the flight.

3. RECOMMENDATIONS

The Safety Board is considering recommendations regarding the establishment or rejuvenation of the air line pilots professional standards committees and a review of the existing pilot dispatcher relationship. When these recommendations are approved, they will be published separately.

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

William R. Haley, Member, was absent and did not participate in the adoption of this report.

April 11, 1974

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified that the aircraft was missing at 2320 on September 27, 1973. An investigation team immediately went to Texarkana, Arkansas, to await location of the aircraft.

After the aircraft was located, team members immediately went to the scene, and the investigation command post was located in Mena, Arkansas. Investigative groups were established for operations, witnesses, and air traffic control; human factors; structures; systems; powerplants; maintenance records; flight data recorder; and cockpit voice recorder.

The FAA, Texas International Airlines, Inc., the Airline Pilots Association, General Dynamics/Convair, Airesearch Manufacturing Company, Dowty Rotol Incorporated, and Rolls-Royce Aero Engineer, Inc., assisted the Board in its investigation.

2. Hearing

There was no public hearing.

APPENDIX B

CREW INFORMATION

Captain Ralph MacDonald Crosman, 41, was employed by Texas International Airlines, Inc., on June 15, 1959. He received his airline transport rating on May 12, 1964, and was promoted to captain on May 15, 1964. He became a Convair 600 captain on August 17, 1967. He completed his last proficiency check on September 18, 1973, and his most current line check on May 8, 1973. He received 16 hours of recurrent ground school training for the CV-600 on February 22, 1973. Captain Crosman's last first-class medical certificate was issued on September 18, 1973, with no waivers or restrictions. He flew flight 683/655 nine times during September, excluding the flight on which the accident occurred. All of these flights were with First Officer Tumlinson.

Captain Crosman's flight history during his employment by Texas International Airlines, Inc., was reviewed. All reports made by designated airline check airman and FAA inspectors indicated that his performance was satisfactory.

Interviews with some first officers who had flown with Captain Crosman disclosed that they considered him to be an average pilot and an amiable person. They stated that although there was never any doubt that Captain Crosman was in command of a flight, he allowed his first officers to make their own decisions when it was their turn to fly and that he rarely disagreed with them. The first officers interviewed also reported that, at times, Captain Crosman appeared to be "preoccupied" or not totally attentive to his cockpit duties.

First Officer William Fred Tumlinson, 37, received his commercial pilot rating on January 7, 1963. He was employed by Texas International Airlines, Inc., on October 18, 1965, and became a first officer on CV-600 aircraft on August 31, 1967. He completed his last proficiency check on December 2, 1972, and received 16 hours of recurrent ground training for the CV-600 on February 23, 1973. First Officer Tumlinson's last first-class medical certificate was issued on April 16, 1973, with no restrictions or waivers.

A review of First Officer Tumlinson's flight history while he was employed by Texas International Airlines, Inc., indicated that his performance had been satisfactory.

Cabin Attendant Marella Latzer, 23, was employed by Texas International Airlines, Inc., on October 19, 1972. Her last recurrent training was completed on May 10, 1973.

<u>Item</u>	<u>Captain Cresman</u>	<u>First Officer Tumlinson</u>
Total flight time	11,800 hrs.	7,106 hrs.
Total CV-600 time	6,000 hrs.	4,500 hrs.
Airman certificate types	Airline Transport Rating	Commercial
Airman certificate numbers	1318357	1512021
Ratings	DC-3, Convair 240/340/440/600/640 Comm. Priv., Airplane Single and Multi-engine Land (SMEL)	Airplane SMEL Instrument
Hours flown:		
Last 3 months	199:54	205:38
Last 2 months	129:39	156:08
September	75:09	76:19
Last 24 hours before Flight 655	3:08	3:06
This flight	1:58	1:53
Duty time last 24 hours	6:54	6:54
Rest period in preced- ing 24-hour period	19:20	19:20

APPENDIX C

AIRCRAFT INFORMATION

Aircraft N94230, a General Dynamics Convair CV-600 (240D), Serial No. 56, was owned and operated by Texas International Airlines, Inc. The aircraft was manufactured on April 18, 1948. It was delivered to Texas International Airlines, Inc., from American Airlines on February 20, 1961, and was placed into scheduled service on March 9, 1961.

N94230 was converted to the CV-600 (240D) configuration on February 15, 1967, at a total time of 37,065 flight hours. This conversion was accomplished by Texas International Airlines, Inc., according to supplemental Type Certificate No. SA 1054 WE. The aircraft had a capacity of 44 passengers.

The total airframe time and total landings since new through the last recorded maintenance (turnaround check) were 51,208:22 hours and 25,913 landings, respectively. This maintenance was accomplished at Dallas, Texas, on September 27, 1973. During the check, maintenance personnel repaired the No. 2 ADF sense antenna, which was the only discrepancy listed on the log sheet.

Scheduled maintenance was accomplished by turnaround checks (daily), "A" checks (every 50 hours), "B" and "C" checks (periodic), and progressive overhauls (continuous airworthiness visit (CAV)). The flight hours and dates at which most recent checks were made are as follows:

- (1) "A" Check - 51,174:06 hours on 9/22/73
- (2) "B & C" Check - 50,985:48 hours on 8/19/73
- (3) CAV Check - 50,536:20 hours on 5/31/73

The aircraft was equipped with two Dart Model RDQ 10 (542-4) engines. Engine serial numbers and times were as follows:

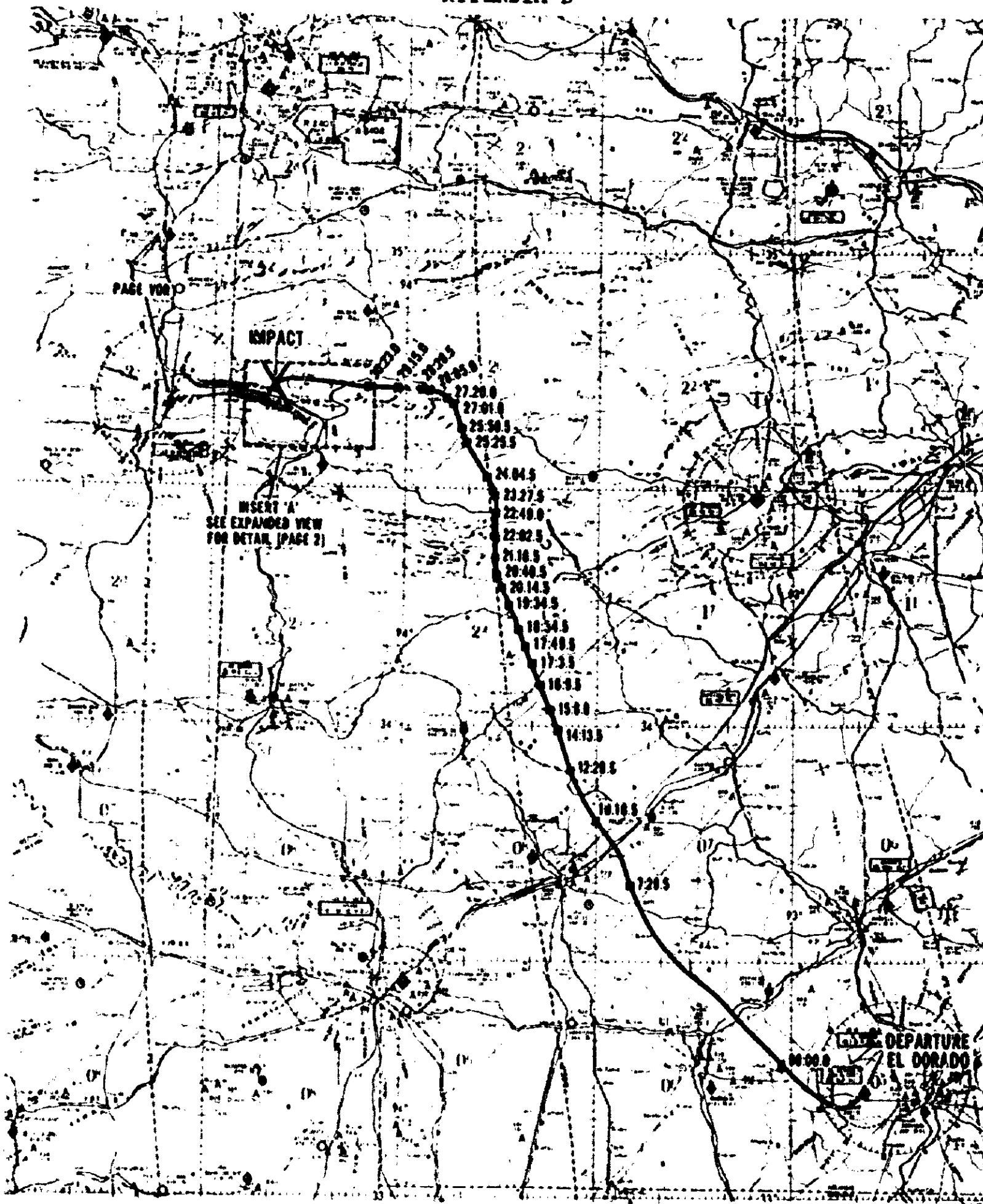
<u>Engine No.</u>	<u>Date Installed</u>	<u>Serial No.</u>	<u>TSO Hrs.</u>	<u>Total Time at Last Recorded Maintenance</u>
1	May 29, 1973	40071	2,184:06	10,756:55
2	Dec. 28, 1972	40014	1,272:36	12,076:10

The engines were equipped with Dowty-Rotol type R245/4.40.4.5/13 propellers. Propeller serial numbers and times were as follows:

<u>Propeller No.</u>	<u>Date Installed</u>	<u>Serial No.</u>	<u>TSO Hrs.</u>	<u>Total Time at Last Recorded Maintenance</u>
1	9/24/73	DRG/217/66	2,854:52	11,261:48
2	12/28/72	DRG/249/66	1,272:36	11,346:12

There are no mechanical interruption summaries and service difficulty reports to reflect any pertinent discrepancies on the aircraft on or before the accident. According to company records, airworthiness directives were up to date, and all components were within the required time limits.

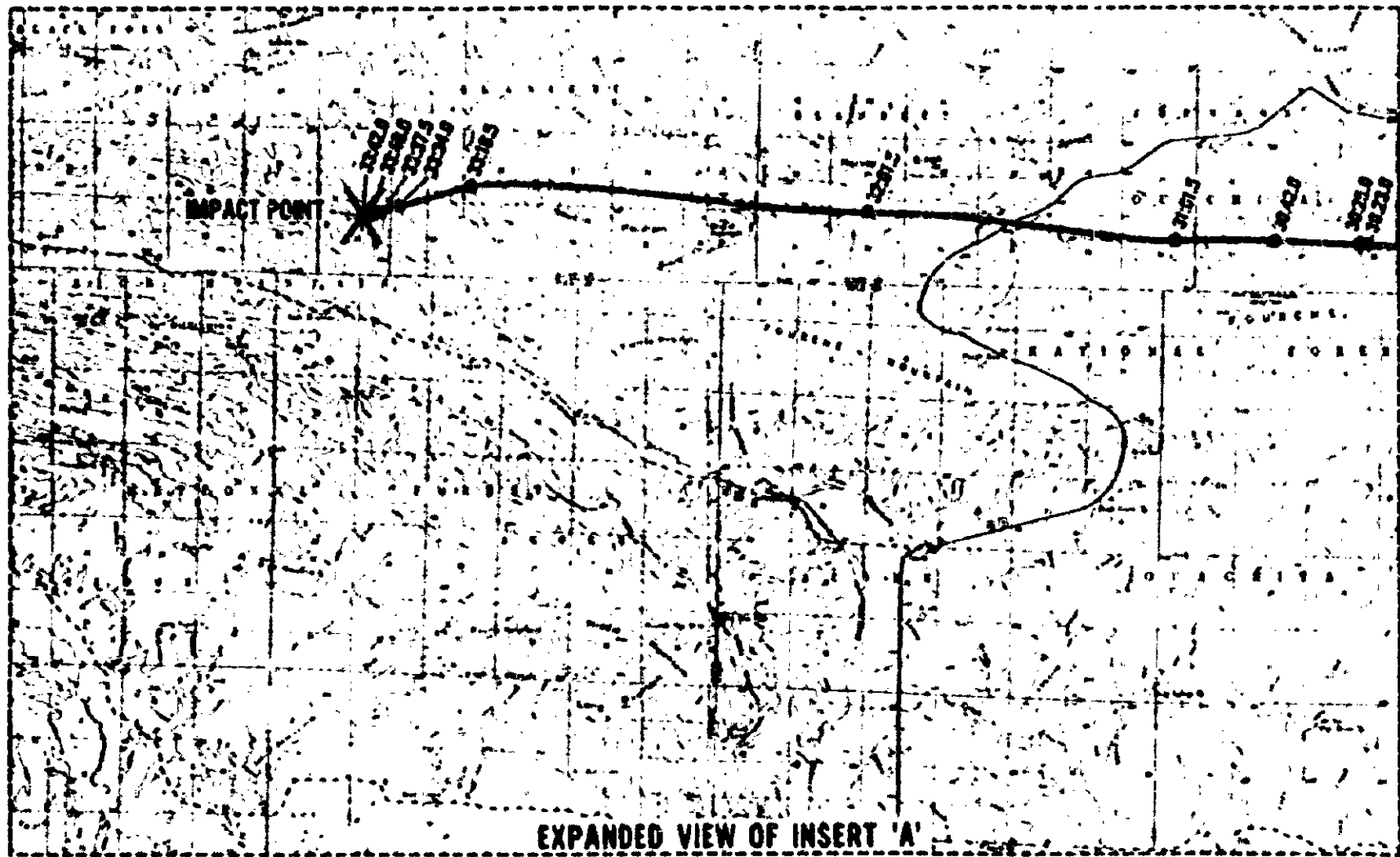
APPENDIX D



SCALE:
0 10 20 30
NAUTICAL MILES

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

FLIGHT TRACK PRESENTATION
TEXAS INTERNATIONAL AIRLINES
CONVAIR CV-600, N94320
FLIGHT NO. 655
MENA, ARKANSAS
September 27, 1973



Reproduced from
best available copy.

1. Times shown correspond to those relative times assigned to intra-cockpit conversation transcribed from the Aircraft Cockpit Voice Recorder. Sounds of impact occurred approximately 37 minutes 20 seconds after departure from El Dorado.
2. The Flight Track shown was derived from airspeed and heading data captured by the Aircraft Flight Data Recorder and estimated en route wind information.

APPENDIX E

TRANSCRIPT OF COCKPIT VOICE RECORDER DATA REGARDING
A FAIRCHILD MODEL A-100, S/N 1334, TEXAS INTERNATIONAL
AIRLINES, CONVAIR CV-600, N94230, FLIGHT 655,
MENA, ARKANSAS, SEPTEMBER 27, 1973

END

CAM Cockpit area microphone
RDO Transmissions from unknown source
-1 Voice identified as Captain
-2 Voice identified as First Officer
-? Voice unidentified
* Unintelligible
Nonpertinent word
% Break in continuity
() questionable text
(()) Editorial insertion
. . . Pause

Note: All times expressed in elapsed time.

Warning

The reader of this report is cautioned that the transportation of a CVR tape is not a precise science but is the best product possible from an NTSB investigative group effort. The transcript or parts thereof, if taken out of context, could be misleading. The attached CVR transcript should be viewed as an accident investigation tool to be used in conjunction with other evidence gathered during the investigation. Conclusions or interpretations should not be made using the transcript as the sole source of information.

<u>TIME & SOURCE</u>	<u>CONTENT</u>
00:00.0 CAM-2	Yeah?
CAM-1	That might not be a hole there
CAM-2	We know shortly
CAM-2	It sorta looks like twenty-four miles to the end, I don't mind, do you?
CAM-1	I don't care, just as long as we don't go through it
CAM-2	Looks a little strange through there, looks like something attenuating through there
CAM-2	It's shadow
CAM-1	Yeah, looks like a shadow
CAM-1	Is that better?
CAM-2	Nav, I don't care
CAM-1	Suit yourself
CAM-2	Well, I don't know, looks a little light in here, this thing hits your eyeballs pretty hard
CAM-2	That's right
CAM-1	That's what I'm holding this thing for
CAM-2	That's all right, it doesn't hurt if she's bright
CAM-1	As long as you've got it
CAM-2	See something?
CAM-1	I think it's snow
CAM-2	I still think that's a shadow
CAM-2	I do, too
CAM-2	Wanna go around?
CAM-1	Yeah, why not
CAM-2	All right
CAM-1	I'd slow it up a little bit too

<u>TIME & SOURCE</u>	<u>CONTENT</u>
CAM-1	Good chance
CAM-2	Whata we got, decreasing (ground pickup)
CAM-1	I didn't hear you
CAM-2	The visibility is dropping
CAM-1	Yeah
CAM-2	Well
CAM-2	Rain.
CAM-1	Raining (all over the place)
07:29.5 <u>Note</u>	Two one Alpha, roger ((radio transmission heard on RDO-1 and 2, source unknown))
08:40.0 CAM-1	You got something down there
CAM-2	The other one's a rain data, look at it
CAM-1	Yeah, it's probably getting ground clutter down there
CAM-1	That's ground
CAM-2	What's all this, lights, in those fields? What the # are they, chicken farms?
CAM-1	Yeah
CAM-2	God Almighty
CAM-2	They're planning on growing a few eggs, ain't they
CAM-1	Yep, that's what they are
CAM-?	Whistle
CAM	Sound of ambient noise increases
CAM-2	What the # have I got there, ya know?
10:18.5 CAM-?	I thought the end of that line was way back down over there, now

<u>TIME & SOURCE</u>	<u>CONTENT</u>
12:29.5 CAM-2	#, keeps growing on us
CAM-1	No, not really
14:13.5 CAM-2	It's a real cute lil' old curlycue, ain't it?
CAM-1	Yeah, ha, ha
CAM-1	There's not much to that, but we gotta stay away from it 'cause we'll be vee, IFR
CAM-2	Si
CAM-2	#, I can't get this # stupid radar * *
CAM-2	You got any idea where we're at?
15:06.0 CAM-1	Yeah, two sixteen'll take us right to the VOR
CAM-2	Two, ah
CAM-1	Two oh nine, I got
CAM-2	Fifteen
CAM-1	I'm not concerned with that, I could care less
CAM-1	I guess you're right. That, that is just extending on and on and on as we go along 'cause it hasn't moved in about three or four miles in the last thirty minutes, it seems like
CAM-1	I guess it's building up that way (now)
CAM	Sound of whistling
CAM-1	What's Hot Springs?
16:09.5 <u>Note</u>	Hello there Dallas, this is nine, uh ((radio transmission heard on RDO-1 and RDO-2, source unknown))
CAM-2	Sir?
CAM-1	What's Hot Springs VOR? Is it ten zero, is that right?

TIME &
SOURCE

CONTENT

CAM-2 Yeah, yeah, uh, that's right

CAM-2 We don't want to get too far up the # # # # it gets hilly

CAM-1 Yeah, . . . stars are shining

CAM-1 Why don't you try two thousand?

17:03.5
CAM-1 If we get up here anywhere near Hot Springs, we get in the # mountains

CAM-2 Uh, you reckon there's a ridge line along here somewhere?

CAM-? * *

CAM-2 Go down five hundred feet, you can see all kinds a lights

CAM-(2) Let's go ahead and try for twenty-five hundred

17:49.5
CAM-1 All right

CAM-1 Fred, you can quit worrying about the mountains 'cause that'll clear everything over there

CAM-2 That's why I wanted to go to twenty-five hundred feet

CAM-2 That's the Hot Springs highway right here, I think

CAM-1 You 'bout right

CAM-2 Texarkar . . . naw, it ain't either

CAM-2 #, Texarkana's back here

CAM-1 Texarkana's back over here, somewhere

CAM-2 Yeah

CAM-2 This ain't no Hot Springs highway

18:34.5
CAM-1 Well thirty degrees . . . thirty degrees takes you right to Texarkana doesn't it? Hot Springs . . . here we are sittin' on fifty

CAM-2 Yeah

CAM-2 How we doin' on that # # # #? Look how we're gainin' on the ground

<u>TIME & SOURCE</u>	<u>CONTENT</u>
CAM-1	I don't know, Fred, still we keep gettin' another one poppin' up every time . . . every time
19:34.5 CAM-2	If we keep this up indefinitely, we'll be in Tulsa
CAM-1	I haven't been in Tulsa in years
CAM-2	((Laugh)) ha, ha, ha
CAM-2	The last time I was with Glen Duke, he said go whichever way you want to. I was going out of Abilene going to Dallas, took up a heading zero one zero and flew for about forty-five minutes, and he said, Fred, you can't keep going on this, on this heading. I said why. He said, #, you gonna be in Oklahoma pretty soon. I said, I don't care if I'm in Oklahoma. He said, fair enough
20:14.5 CAM-2	How'd I get all this # speed?
CAM-1	You're all right
CAM-2	(Pile it on) we'll keep this speed here?
CAM-1	A little while
CAM-2	There ain't no lights on the ground over there
CAM-1	Yeah, I see 'em behind us
CAM-1	See stars above us
20:40.5 CAM-2	I got some lights on the ground
CAM-1	There's just not many out here
CAM-2	Maybe . . . could be somethin' else, coach
CAM-1	Aha, we're gettin' rid of the clouds
CAM-1	We'ls in the clouds, Fred
CAM-2	Are we?
CAM-1	Yeah
CAM-1	No, we're not
21:16.5 CAM-1	I can see above us

TIME &
SOURCE

CONTENT

CAM-2 We got (ground) up ahead?

CAM-1 I can see the ground here

CAM-2 Yeah, I can see the ground down here, too

CAM-1 Yeah * * *

CAM-1 North is a fair heading, north

CAM-2 Now, what have we got here?

CAM-1 Naw, you're all right, I can see some lights over here

CAM-2 I'll tell ya what, coach . . .

22:02.5
CAM-2 That's probably Hot Springs

CAM-1 Yep, could be

CAM-1 Yeah, that might be either it or Arkadelphia

CAM-2 Well, I'm getting out of the clouds here Mac, but I'm getting right straight into it

CAM-1 Oh, looks like you're all right

CAM-2 Do you see any stars above us?

CAM-2 We're going in and outta some scud

CAM-1 Yeah, we've got a little bit here

CAM-2 I sure wish I knew where the # we were

22:49.0

CAM-1 Well, I tell you what, we're, ah, on the two fifty . . . two sixty radial from, ah, Hot Springs

CAM Heavy static

CAM-2 Figure I can kick her on up here, maybe I can outrun it

CAM-1 I don't, I don't think you can get up

CAM-2 Well, I, I got the # thing pointed almost straight up to see what we got out here

23:27.5
CAM-2 Paintin' ridges and everything else boss and I'm not familiar with the terrain

<u>TIME & SOURCE</u>	<u>CONTENT</u>
CAM-2	We're staying in the clouds
CAM-1	Yeah, I'd stay down. You're right in the (some) right in the base of the clouds
CAM-1	I tell you what, we're gonna be able to turn here in a minute
CAM-2	You wanna go through there?
CAM-1	Yeah
24:04.5 CAM-2	All right
CAM-2	Good, looking good, Mac. Looking good
CAM-1	That's all right, wait a minute
CAM-2	Well, I can't even get, ah, Texarkana any more
CAM-1	I'll tell you what, Fred
CAM-2	'kay, boss
CAM-1	Well, ah, we'll just try that, we'll try it. We're gonna be in the rain pretty soon. It's only about two miles wide
CAM-2	You tell me where you want me to go
CAM-1	Okay, give me a heading of, ah, three forty
CAM-2	Three forty?
25:25.5 CAM-1	Three forty
CAM-1	Steady on
CAM-1	We got ten miles to go 'n' we're gonna turn . . .
CAM-1	To the left about, ah, 'bout fifty degrees
CAM-2	Won't me to turn, did ya say fifty?
CAM-1	Yeah, fifty left
CAM-1	On about, uh, two ninety
CAM-2	Two ninety
25:59.5 CAM-1	Ya got six miles to turn

<u>TIME & SOURCE</u>	<u>CON'TENT</u>
CAM-1	Three miles south of turn
CAM-2	We're in it
CAM-1	Huh?
CAM-2	We're in solid, now
CAM-1	Are we?
CAM-2	Hold it
27:01.0 CAM-1	Start your turn . . . standard rate
CAM-1	Level out and let me see it . . . when you hit two ninety
CAM-2	Aw, okay
27:20.0 CAM-2	There's your two ninety
CAM-1	Steady on
CAM-1	Should hit in about a half a mile. Should be out of it in 'bout two miles
CAM-1	You're in it
CAM-1	Are you through it?
28:05.0 CAM-1	Turn thirty left
CAM-2	I can see the ground, now
28:20.5 CAM-2	There's thirty left
CAM-2	Naw, that's thirty-five #
CAM-1	Keep on truckin', just keep on a-truckin'
CAM-2	Well, we must be somewhere in Oklahoma
CAM-1	Doin' all the good in the world
CAM-2	Do you have any idea of what the frequency of the Paris VOR is?
CAM	Nope, don't really give a #

<u>TIME & SOURCE</u>	<u>CONTENT</u>
29:15.0 CAM-1	Put, uh, about two sixty-five, heading two sixty-five
29:19.0 CAM-2	Heading, two sixty-five
CAM-2	I would say we # up
CAM-1	Think so?
CAM-?	Laughter
CAM-1	Didn't we?
30:23.0 CAM-1	Fred, descend to two thousand
30:25.0 CAM-2	Two thousand, coming down
30:42.0 CAM-2	Here we are, we're not out of it
CAM-1	Let's truck on
31:01.5 CAM-1	'bout five to the right
CAM-1	Shift over a little bit if you can
CAM-1	Sure can
CAM-1	That's all right
CAM-2	Right #
CAM-1	That's all right, you're doin' all the good in the world
CAM-1	I thought we'd get, I thought it was moving that way on me only, we just kinda turned a little bit while you was looking at the map
CAM-2	Look
CAM-1	First time I've ever made a mistake in my life
CAM-2	I'll be #. Man, I wish I knew where we were so we'd have some idea of the general # terrain around this # place

TIME &
SOURCE

CONTENT

CAM-1 I know what it is

CAM-2 What?

32:01.5
CAM-1 That the highest point out here is about twelve hundred feet

CAM-2 (That right)?

CAM-1 The whole general area, and then we're not even where that is, I don't believe

CAM-2 I'll tell you what, as long as we travel northwest instead of west, and I still can't get Paris

CAM-? Whistling

CAM-1 Go ahead and look at it

CAM-? Whistling

CAM-? #

CAM-? Whistling

33:18.5
CAM-2 Two hundred and fifty, we're about to pass over Page VOR

CAM-2 You know where that is?

CAM-1 Yeah

CAM-2 All right

33:34.0
CAM-1 About a hundred and eighty degrees to Texarkana

33:37.5
CAM-2 About a hundred and fifty two

33:40.0
CAM-2 Minimum en route altitude here is forty four hund . . .

33:42.0 Sound of impact