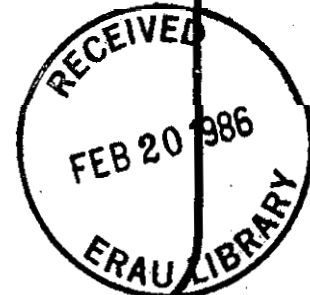


PB-212 484

AIRCRAFT ACCIDENT REPORT. TANDY CORPORATION GATES LEARJET MODEL 25, N653TC, NEAR THE VICTORIA COUNTY, FOSTER AIRPORT, VICTORIA, TEXAS, 18 JANUARY 1972

National Transportation Safety Board
Washington, D. C.

9 August 1972



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NATIONAL TRANSPORTATION SAFETY BOARD

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AIRCRAFT ACCIDENT REPORT

TANDY CORPORATION

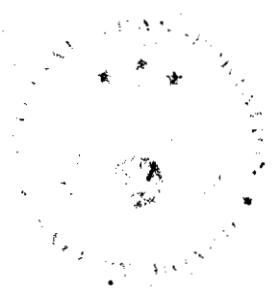
GATES LEARJET MODEL 25, N6587C

NEAR THE

VICTORIA COUNTY-FOSTER AIRPORT

VICTORIA, TEXAS

JANUARY 18, 1972



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NATIONAL TRANSPORTATION SAFETY BOARD

REPORT NO. NTSB/AAR-72-24

REPORT NUMBER: 72-24

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AIRCRAFT ACCIDENT REPORT

TANDY CORPORATION
GATES LEARJET MODEL 25. N658TC
NEAR THE
VICTORIA COUNTY- "FOSTER AIRPORT"
VICTORIA, TEXAS
JANUARY 18, 1972

ADOPTED: AUGUST 9, 1972

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591
REPORT NUMBER: NTSB- AAR-72-24

TABLE OF CONTENTS

	<i>Page</i>
SYNOPSIS	1
INVESTIGATION	2
ANALYSIS AND FINDINGS	4
PROBABLE CAUSE	6
RECOMMENDATIONS	6
APPENDIX A	9
APPENDIX B	10

SPECIAL NOTICE

This report contains the essential items of information relevant to the probable cause and safety message to be derived from this accident/incident. However, for those having a need for more detailed information, the original factual report of the accident/incident is on file in the Washington office of the National Transportation Safety Board. Upon request, the report will be reproduced commercially at an average cost of 15¢ per page for printed matter and 85¢ per page for photographs, plus postage. (Minimum charge is \$2.00.)

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: August 9, 1972

TANDY CORPORATION
GATES LEARJET MODEL 25, N658TC
NEAR THE VICTORIA COUNTY-FOSTER AIRPORT
VICTORIA, TEXAS
JANUARY 18, 1972

SYNOPSIS

A Gates Learjet Model 25, N658TC, operated as a corporate aircraft by the Tandy Corporation, Fort Worth, Texas, crashed at approximately 0745 central standard time (c.s.t.) on January 18, 1972, during a nonprecision instrument approach to the Victoria County-Foster Airport, Victoria, Texas. The two crewmembers and seven passengers received fatal injuries and the aircraft was demolished by impact and ground fire.

The aircraft departed from Meacham Field, Fort Worth, Texas, at 0704 c.s.t., on an Instrument Flight Rules clearance to Victoria.

Approximately 1 hour prior to departure the pilot had received a weather briefing from the Fort Worth Flight Service Station which indicated, in part, that the prevailing visibility at Victoria was 5 miles and was forecast to decrease to no less than 3 miles. Coincident with the receipt of an approach clearance, at 0740 c.s.t., the pilot was provided with a special weather observation for Victoria which indicated a decrease in the prevailing visibility to 1/4 mile in fog. The pilot's response to this information was "...we'll go take a look at it... stay with you."

The aircraft struck the ground and a power pole 1.7 nautical miles short of the runway threshold.

Witnesses in the area of the crash reported heavy fog conditions with visibility restricted to approximately 100 feet. The minimum visibility for an authorized landing at the Victoria County-Foster Field Airport was 1 nautical mile for this aircraft.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the lack of altitude awareness on the part of the flightcrew while descending into known weather conditions which were conducive to a rapid deterioration in forward visibility. The Board believes that the action of the crew might have been influenced by a visual, illusory effect produced by a shallow layer of dense fog, combined with the relative position of the sun.

RECOMMENDATIONS

The Safety Board is concerned about the frequency of accidents which occur during landing approaches under adverse weather conditions. This concern prompts the Board to urge the Federal Aviation Administration to increase the attention being focused upon possible solutions to this problem.

The Board recommends that the Federal Aviation Administration (FAA) ensure the widespread dissemination of Advisory Circulars and Air Carrier Operations Bulletins which emphasize the hazards associated with weather conditions characterized by a partial obscuration caused by shallow dense fog. The Board further recommends that the FAA review existing material related to such hazards for adequacy in describing the visual, illusory effects which may confront a pilot when descending into such conditions.

The Board supports the FAA in the issuance of a Notice of Proposed Rule Making 72-17 entitled Landing Minimums on July 20, 1972, and recommends expeditious action in incorporating those changes to the Federal Aviation Regulations which will restrict the Part 91 Operator from initiating an approach when the reported visibility is less than the specified landing minima.

INVESTIGATION

The Gates Learjet Model 25, N658TC was owned and operated by the Tandy Corporation, Fort Worth, Texas. The purpose of the flight on January 18, 1972, was to transport seven passengers from Fort Worth to Victoria, Texas. At 0604 c.s.t.,¹ the pilot of the aircraft had been briefed on the current and forecast weather for the route of flight by the Fort Worth Flight Service Station and had then filed an Instrument Flight Rules (IFR) flight plan to the Victoria County-Foster Airport at Victoria, Texas (VCT). He estimated a time en route of 45 minutes and specified 3 hours of fuel on board the aircraft. The designated alternate airport was Austin, Texas.

The aircraft departed from Meacham Field at 0704 and climbed to Flight Level (FL) 290² as cleared by the Fort Worth Air Route Traffic Control Center (ARTCC). At 0732, the Hou-

ston ARTCC cleared N658TC to start a descent to FL 240; 3 minutes later, N658TC was cleared to descend to and maintain 10,000 feet and to report leaving FL 240, and was given the current VCT altimeter setting of 30.03 inches. At 0739, N658TC reported leaving 15,500 feet and was further cleared to descend to and maintain 5,000 feet. At 0740, the VCT 0718 special weather observation was transmitted to N658TC as follows:

Sky partially obscured, two thousand scattered, estimated eight thousand broken, one-quarter of a mile visibility with fog, wind calm.

N658TC replied, "Tango Charlie, Roger, we'll go take a look at it stay with you."

N658TC reported out of 9,000 feet at 0741:10 and out of 8,000 feet at 0741:40. At this time the aircraft was cleared by the Houston ARTCC for the approach to VCT³. At 0744, Houston ARTCC queried N658TC about the weather as it looked from their present position. N658TC replied, "Tango Charlie, we can't tell, we're still at three thousand feet." Houston ARTCC informed N658TC, "Radar contact is lost five miles northwest of Victoria," and asked for the aircraft altitude. The pilot replied, "Three thousand Tango Charlie." No further radio transmissions were received from N658TC.

Two witnesses, who live near the approach-zone area, heard an aircraft and noted that there were no unusual sounds other than that the aircraft sounded low and loud. They then heard a loud noise coincident with a rumble that shook their house. Their electric lights went out and they later noticed that their electric clock had stopped at 0745. After a search in heavy fog, they located the aircraft wreckage about 1,400 feet southwest of their house. They stated that it was so foggy that they could see only about 100 feet.

The accident site was 1.7 nautical miles from the approach end of Runway 12L and about

¹All times used are central standard time, based on the 24 hour clock.

²Approximately 29,000 feet mean sea level (m.s.l.).

³The landing minima for a VOR nonprecision approach to Runway 12L are 400 feet ceiling and 1 mile visibility for the Gates Learjet type aircraft.

1,800 feet left of the centerline projected from the VOR⁴ facility toward the runway. (For details see Appendix B.) The aircraft was almost completely demolished by the surface impact and subsequent ground fire. All occupants in the aircraft were fatally injured.

All major structural components as well as all control surfaces were accounted for in the wreckage. The compressor and turbine stators of both engines sustained considerable rotation damage. The interstage bleed valves and inlet guide vanes were open.

The damage to many of the aircraft's systems components inflicted by impact forces and subsequent postimpact fire was so extensive as to preclude a positive determination of total systems capabilities at the time of impact.

The landing gear hydraulic selector valve was in the gear retract position as was the landing gear control handle.

The Pitot and static pressure systems were completely disrupted by aircraft breakup and ground fire. There were no obstructions to any of the recovered static port plates and the Pitot heads.

Most of the aircraft flight instruments, including both of the panel mounted barometric altimeters, were recovered. Both altimeters were set at 30.03 inches Hg. The altimeter on the pilot's panel was a servo-driven unit which required a.c. electrical power for operation. When examined by the Board at the facilities of the manufacturer, Intercontinental Dynamics Corporation, the altitude-encoding module was found to be in a position corresponding to an output-coded altitude of 100 feet m.s.l. This output is based upon the standard sea level pressure 29.92 inches Hg., and since the output is resolved only to 100-foot increments, a ± 50 -foot tolerance results. The instrument was capable of operation upon application of electrical power.

The copilot's altimeter was examined by the Board at the facilities of the instrument division

of Lear Siegler, Inc., the manufacturer of the unit. Impact damage precluded a determination of the instrument reading at the time of impact. There were no defects noted during disassembly which would have affected the instrument's performance during flight.

The altitude alert module, which worked in conjunction with the pilot's altimeter, had a selected alert altitude of 1,400 feet. This setting could not be related to the altitudes specified in the approved procedure for the subject approach.

The aircraft was also equipped with a radio altimeter system. The face and the transceiver for this unit were not recovered. The minimum altitude selector panel⁵ was recovered and indicated that an altitude of 426 ± 45 feet had been selected.

The aircraft weight and center of gravity were calculated to have been within the prescribed limits.

The aircraft's maintenance history indicated that it was being maintained in accordance with prescribed standards.

The crewmembers were certificated and qualified to conduct this operation. A post-mortem examination of the flight crewmembers revealed no evidence to indicate any preexisting disease or condition that would have affected the performance of their duties. Both crewmembers had adequate periods for rest prior to flight.

The Air Traffic Control Specialist at the Flight Service Station, Fort Worth, stated that he had briefed the pilot of N658TC by telephone giving the weather for Victoria, Palacios, and Austin, Texas. The information used for the Victoria weather was, in part, as follows:

VCT Terminal Forecast For The Period 0500-1000

800 feet scattered clouds, ceiling 2,000 feet overcast, variable to ceiling 800 feet, broken

⁵The radio altimeter minimum-altitude selector panel provides for a selection of the height above terrain at which a visual warning is presented.

⁴Very high frequency omnidirectional radio range.

clouds, 2,000 feet overcast, visibility 3 miles with light drizzle and fog, chance of light rain showers.

At 0720, an amended forecast for VCT was issued by the National Weather Service and was, in part, as follows:

0720.0800 partial obscuration, ceiling 8,000 feet broken clouds, visibility 1 mile, ground fog, variable to ceiling 200 feet obscured, visibility one-half mile, light drizzle, fog, chance of light rain showers.

This weather forecast was not available to the pilot of N658TC.

The pilot had neither requested nor received any additional weather information until 0740 when the 0718 VCT weather was provided to him by Houston ARTCC. The following are selected surface weather observations for VCT made by the National Weather Service at the times indicated:

0718 Special - sky partially obscured, 2,000 feet scattered clouds, estimated 8,000 feet broken clouds, visibility 1/4 mile, fog, wind calm, altimeter setting 30.03 inches, fog obscuring 1/10 of the sky.

0755 Sky partially obscured, 2,800 feet scattered clouds, estimated 9,000 feet broken clouds, visibility 1/8 mile, fog, temperature 58° E., dew point 57° E., obscuring 1/10 of the sky.

It was determined that at the time and place of the accident, the sun was 4° above the horizon and would have been 26° south of east or at an azimuth of 116°.

The approach chart for the nonprecision approach to the Victoria County-Foster Airport depicts an inbound heading of 124° to be flown to the VOR, with a specified crossing altitude of 1,000 feet. After station passage, descent to the minimum descent altitude (MDA) of 400 feet is authorized on a heading of 124° to the airport. If visual contact with the runway is not established when the pilot reaches the designated missed-approach point, as obtained from elapsed time measurement, he is expected to initiate a missed-approach, climb the aircraft to 1,600 feet

m.s.l., and continue outbound on the VCT VOR radial of 121° within 10 nautical miles. A flight check of the VOR facility indicated that it was operating satisfactorily subsequent to the accident.

The airport is equipped with a rotating beacon, high intensity runway lights, and high-intensity approach lights. All of these lights were operating at the time of the accident.

ANALYSIS AND FINDINGS

The preflight activities were normal and the flight was operationally routine until 0740. At that time, the pilot was informed that visibility at the destination airport was 1/4 mile in fog, which was considerably less than the 1 nautical mile minimum for which landing is authorized. The pilot expressed his intention to execute an approach and the accident occurred during this approach.

Although the precise time of impact could not be determined, at 0744, the position of the aircraft was established as 3 nautical miles northwest of the VOR and descending through 3,000 feet. It is estimated that the aircraft would have taken at least 2 1/2 minutes to traverse the approximate 6.5 nautical miles to the impact site. This would place the aircraft in a descent of about 1,200 feet per minute with impact occurring at 0746.

Examination of the aircraft structure revealed no evidence of an in-flight failure, malfunction, or other abnormality which would have caused a loss of the pilot's ability to control the aircraft. The engines were operating at the time of impact. The impact attitude was indicative of that which would have resulted from an instinctively initiated evasive maneuver. The position of the landing gear hydraulic selector valve and control handle indicated that the gear was retracted or in the process of retracting when impact occurred.

The aircraft was equipped with two barometric altimeters connected to independent static systems. Detailed examination of both altimeters

revealed no evidence that they were not capable of operation at the time of impact. The position of the gear mechanism in the pilot's servo-driven unit when related to an altimeter setting of 30.03 inches Hg. indicated a dial reading of between 150 feet and 280 feet m.s.l.

In view of these findings, the Board concludes that the causal factors of this accident are within the operational area associated with the conduct of the approach and particularly with those insidious circumstances that might have caused a qualified, experienced pilot to continue a descent which resulted in impact with the ground.

The existing weather was characterized by a partial obscuration caused by fog with higher scattered and broken cloud layers. The weather conditions, observed from the ground less than 10 minutes after the accident, were given, in part, as: fog obscuring 1/10 of the sky with horizontal visibility restricted to 1/8 mile. This combination of a low percentage of partial obscuration and the low visibility implies that the fog, although dense, was sufficiently shallow that the predominant portion of the dome of the sky was visible. Based on available data, the depth of the fog layer is estimated to have been between 300 and 400 feet.

Therefore, the aircraft was in the clear during the descent after passing the base of the scattered clouds (2,800 feet) until reaching the approximate altitude coinciding with the MDA. It is probable that the pilots could see the ground surface during this portion of the descent. The actual amount of the visual ground guidance pattern⁶ that a pilot receives as he descends toward a shallow fog layer is dependent upon visual range, cockpit cutoff angle, and the position of the aircraft. Past studies⁷ have indicated that the guidance segment decreases as the aircraft approaches the fog, with a sudden reduction at the instant of fog layer penetration. This pre-

⁶Visual ground guidance pattern and guidance segment refer to that portion of the ground which is visible to provide cues on which pilot judgment and reactions are based during visual flight.

⁷Aircraft Accident Report, Piedmont Airlines Fairchild Hiller 227B, N712U, Charleston, West Virginia, August 10, 1968.

sents a particularly hazardous situation since the pilot may develop a false sense of security and fail to recognize the impending loss of forward visibility and ground reference. Also, it has been shown that the sudden reduction in visual range on entering the fog may be misinterpreted for a pitch change in the noseup direction, an illusion which may cause a delay in the pilot initiated action to arrest the aircraft rate of descent.

It is believed that in this accident the necessary transition from visual to instrument flight may have been further impaired by the relative position of the sun. At the time of the accident, the sun was 4° above the horizon and within 15° of being directly ahead of the aircraft. That the sun was visible as the aircraft approached the fog can only be surmised. If such was the case, the visual accommodation to revert to instrument reference would have contributed to a delay in the pilot's reaction.

From the last voice-communication-referenced position, 5 miles northwest of the VOR, it would be expected that the pilot would have descended to the initial approach altitude of 1,000 feet and would have intercepted the inbound radial of 124°. After passing the VOR, the approach procedure is to descend to the MDA, specified as 400 feet m.s.l. Further descent is not authorized until markings clearly identifiable with the approach end of the runway are visible. The Board believes that the crew, having visual contact with the ground and failing to recognize impending loss of the guidance segment, was not overly concerned with vertical reference until the aircraft approached the top of the shallow, dense fog layer, very close to MDA. It is unlikely that the crew could have identified approach lights or other markings associated with the runway at this time in the approach. Upon entering the fog layer, the crew certainly lost all forward visual reference. The Board believes that the illusion of a pitchup and the difficulty in accommodating to instrument reference caused the pilot to delay actions which would have arrested the descent at a safe level.

This accident emphasizes the necessity for maintaining altitude awareness throughout an approach regardless of the presence of visual reference. The Board believes that this accident would not have occurred if the crew had adhered to optimum procedures and observed MDA penetration criteria in the conduct of the nonprecision approach.

Because of the rapid development of fog at Victoria, the surface visibility at arrival time was considerably less than had been anticipated by the pilot by means of the forecast provided to him during the preflight briefing. While the flight was en route, an amended forecast had been issued, but the pilot did not have advantage of that information.

If the preflight forecast had indicated that the visibility at Victoria was expected to drop to between one quarter and one-eighth mile in fog by arrival time, it is conceivable that the pilot might not have initiated the flight, or might have planned his flight to the alternate destination. Regardless of the forecast, however, the pilot was informed that the visibility had dropped to 1/4 mile in fog prior to the initiation of the approach. The Board believes that the pilot used poor judgment in attempting the approach under the weather conditions which prevailed.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the lack of altitude awareness on the part of the flightcrew while descending into known weather conditions which were conducive to a rapid deterioration in forward visibility. The Board believes that the action of the crew might have been influenced by a visual illusory effect produced by a shallow layer of dense fog, combined with the relative position of the sun.

RECOMMENDATIONS

The number of accidents that have occurred during recent years which have involved an attempted landing approach in weather condi-

tions wherein visibilities near or below specified landing minima is a matter of utmost concern to the Safety Board. The Board has previously made recommendations to the FAA. These recommendations have related to regulatory changes, improved pilot training aids, the promulgation of information regarding specifically defined hazards, and the development of vertical guidance and ground proximity warning hardware. This accident reemphasizes the need for improvement in these areas. The Board, therefore, urges the FAA to reconsider all these previous recommendations for immediate implementation.

As a result of this accident, the Safety Board recommends that:

The FAA ensure widespread dissemination of information to pilots in all segments of aviation regarding the potential hazards associated with weather conditions characterized by a partial obscuration of the sky caused by a shallow layer of dense fog.

The Board acknowledges the FAA's issuance of Advisory Circulars No. 91-25A, and No. 90-60 both of which provide information regarding the loss of visual cues during low visibility landings. The Board believes that a more detailed training aid should be published which describes the visual illusory effects that can be produced by descent into shallow fog.

The Board notes and supports the FAA in its issuance of Air Carrier Operations Bulletin No. 71-9, which emphasizes the common faults noted in nonprecision approaches and proposes several recommendations to eliminate such faults. The Board believes that this type of information should be promulgated to the general aviation public.

The Board also notes and supports the FAA's Notice of Proposed Rule Making 72-17 entitled Landing Minimums which was issued July 20, 1972, and recommends expeditious action in incorporating these changes to the Federal Aviation Regulations which will restrict the Part 91 operator from initiating an approach when the reported visibility is less than the specified landing minima.

BY 'ME NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/d/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

August 9, 1972

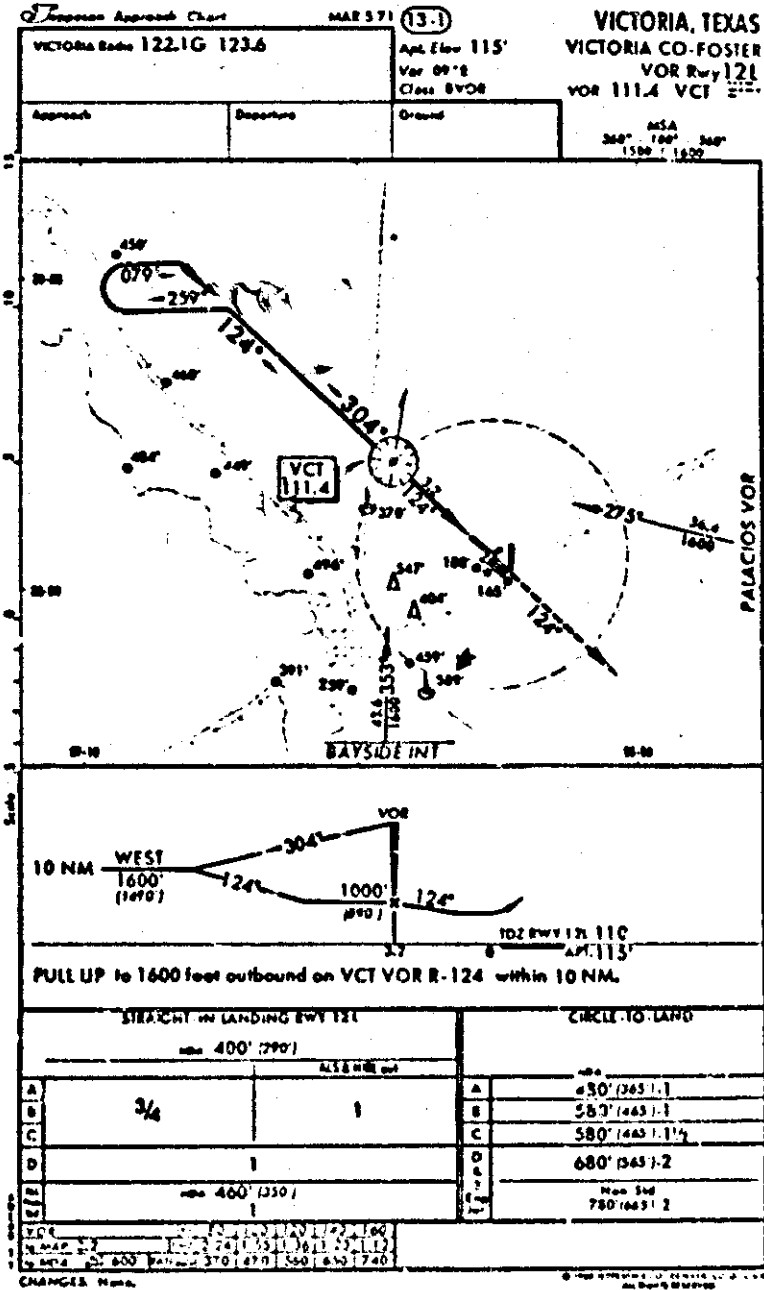
CREW INFORMATION

The designated pilot for the Learjet, N658TC, was Glenn Alvin Clifton, aged 52. He held a Commercial Pilot Certificate No. 229959, with aircraft single- and multiengine land and instrument ratings, with current title as the Chief Pilot for the Tandy Corporation. His latest Federal Aviation Administration second-class medical certificate was dated October 26, 1971, with the limitation that the holder shall possess corrective glasses for near vision. He indicated he had a total of 15,500 pilot flying hours on the application for this certificate. He had type ratings in the Lockheed Model 18, Learjet Model 23/24/25. He had obtained the Learjet 25 type rating on November 6, 1969.

The designated copilot for the Learjet, N658TC, was Cecil Swanner Gibson, aged 29. He held a Commercial Pilot Certificate No. 1518479, with aircraft single- and multiengine land and instrument ratings. His latest Federal Aviation Administration first-class medical certificate was dated November 30, 1971, with no limitations listed. He indicated he had a total of 2,100 pilot flying hours on the application for this certificate.

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APPENDIX B



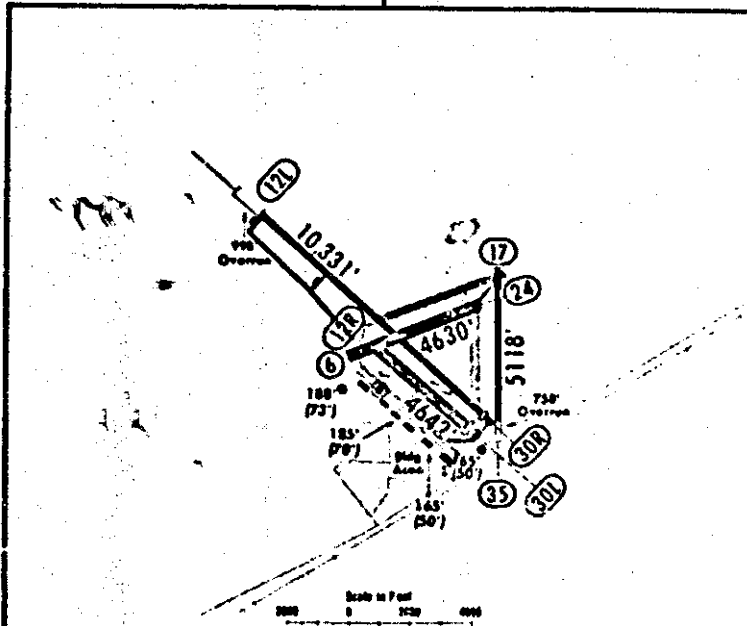
APPENDIX B

VICTORIA, TEXAS
 VICTORIA CO - FOSTER FIELD
 Elev 115° 28' 51" N 96° 55' W

(13-1) MAR 571

Approach Chart

NOTE: Lighted cone & lat.



ADDITIONAL RUNWAY INFORMATION

RWY	LIGHTING	USEABLE LENGTHS			
		Threshold	Landing Beyond Slide & ops	TAKE OFF	WIDTH
24					300'
12R			4242'		300'
12L	HRL HIALS				150'
30R	HRL	10,031'			150'
17					150'
35					

AIR CARRIER TAKE OFF			Landing Weather Minimum	ALTERNATE CEILING-VISIBILITY
TAKE OFF ALTITUDE WITHIN 1/2 MI OF RWY END	TAKE OFF ALTITUDE WITHIN 1/2 MI OF RWY END	TAKE OFF ALTITUDE NOTIFIED		
SCHEDULED				
1/2	1/2	1	1	800-2
1/4	1/4			
0 & 1/4				

CHANGES: Useable lengths rwy 12L & 30L.

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