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AIRCRAFT ACCIDENT REPORT

PAUL KELLY FLYING SERVICE, INC.

LEAR JET 23, N243F

Palm Springs, California

November 14, 1965

Released :

June 29, 1967

**Department of Transportation
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20591**

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SYNOPSIS

About 1721 P.s.t., November 14, 1965, Lear Jet Model 23, N243F, operated as a free transportation flight by the Paul Kelly Flying Service, Inc., crashed shortly after a night takeoff from the Palm Springs Airport at Palm Springs, California. The crash was in the Indio Hills approximately 13 miles east of the airport. The six passengers and two crewmembers were fatally injured. The aircraft was destroyed by impact and fire.

The flight, which was to transport the passengers to Burbank, California, was observed to depart Runway 13 in a normal manner, commence a low-angle climbout, and accelerate to a relatively high speed. Shortly after takeoff the pilot called the Thermal, California Flight Service Station. Although station personnel responded immediately, there were no other transmissions from the flight. About this time the aircraft was observed to make a left turn beneath a low cloud base of about 3,000 feet, proceed in a northerly direction and then enter a steep dive from horizontal flight, and crash.

The Board determines that the probable cause of this accident was spatial disorientation of the pilot, resulting in a loss of control.

1. INVESTIGATION

1.1 History of the Flight

On November 14, 1965, the Paul Kelly Flying Service, Inc., was operating Lear Jet Model 23, N243F, as a free transportation flight for the six passengers from the Palm Springs Airport to Burbank, California. The aircraft was flown on one round trip between these places earlier in the day. The outbound segment of that sequence was flown under Visual Flight Rules (VFR) and the return was under Instrument Flight Rules (IFR). Both were flown mostly by the copilot who was relieved before the second round trip.

After the first round trip, the pilot who continued on duty with a new copilot, filed an IFR flight plan to Palm Springs and return. He declined a weather briefing, but had obtained one from the Thermal FSS at 1301, ^{1/} before the return segment of the first trip. In declining the briefing he also remarked that he had just been over the route. He then departed Burbank at 1552 on an IFR clearance issued only for the segment to Palm Springs and arrived at Palm Springs at 1645. After landing, the pilot remarked to the flight line supervisor that he was late picking up passengers, and did not require refueling. About 15 minutes later the passengers and crew boarded the aircraft for the return flight to Burbank. The pilot occupied the left cockpit seat and the copilot took the right seat.

The flight made a VFR departure from Runway 13 at Palm Springs at approximately 1717. About a minute later the flight called the Thermal FSS, but when the FSS specialist responded promptly there was no answer. After

^{1/} All times herein are Pacific standard, based on the 24-hour clock.

forwarding a flight clearance to another aircraft in the area, the specialist again attempted to contact N243F but was unsuccessful.

Ten persons on the ground saw the aircraft during the takeoff or in flight. Three of them were pilots qualified in the Lear Jet, two of whom overheard the transmissions incident to the flight while monitoring the Thermal FSS radio frequency. The pilots described the takeoff as normal, and said it was within one minute that the pilot initiated the call that proved to be the last known transmission from the flight. One of these pilots reported that there were approximately seven aircraft airborne awaiting IFR clearances from the Thermal FSS when N243F departed. Air traffic clearance delays were amounting to as much as one hour due to the traffic leaving the airport after an air show.

A Lear Jet pilot who landed at Palm Springs shortly before N243F departed, stated that, "The weather was not at all good. Even though the ceiling was at approximately 3,000 feet, there were patches of clouds scattered at lower altitudes. It was also an extremely dark night, and raining. Personally, I feel that attempting to remain VFR . . . under these conditions, particularly in a jet type aircraft, can be extremely dangerous. . . ."

Other witness observations indicate that after takeoff the flight proceeded more than 1-1/2 miles southeast of the airport, and then began a left turn. One witness reported that he saw the lights of the aircraft disappear momentarily and reappear. He said that he then turned his attention from the plane and seconds later saw a bright flash out of the corner of his eye. Two persons, located one mile north of the crash site, stated they saw a moderate size airplane flying north or northeast under the clouds and then saw it dive

into the Indio Hills. The aircraft was described as not spinning or turning. These two witnesses estimated the clouds were at 4,000 feet m.s.l., over their location which was determined to be at a terrain elevation of 1,300 feet m.s.l. They estimated that the time interval of their observations was 5-6 seconds.

The crash site coordinates are approximately 33°48' N latitude and 116°15' W longitude, at a terrain elevation of 1,180 feet m.s.l.

1.2 Injuries to Persons

| <u>Injuries</u> | <u>Crew</u> | <u>Passengers</u> | <u>Other</u> |
|-----------------|-------------|-------------------|--------------|
| Fatal | 2 | 6 | 0 |
| Nonfatal | 0 | 0 | 0 |
| None | 0 | 0 | |

1.3 Damage to Aircraft

The aircraft was destroyed by impact and fire.

1.4 Other Damage

None.

1.5 Crew Information

Paul Kelly, the pilot-in-command, was 62 years of age. He held airline transport pilot certificate No. 22008 with ratings for the DC-3 and commercial privileges for airplane single and multiengine land. He had accumulated about 15,100 total flying hours, of which approximately 125 hours were in the Lear Jet. His Federal Aviation Agency (FAA) second-class medical certificate was issued January 4, 1965, with the limitation, "Holder shall wear correcting glasses and shall have available a second pair of correcting glasses while exercising the privileges of his airman certificate."

Military medical records of the pilot revealed a history of heart trouble and two instances of kidney disorder through 1953. During 1954 he was hospitalized for a neurotic depressive reaction, chronic, moderate, manifested by depression, loss of external interests, occasional suicidal ideation, and severe psychogenic constipation. After showing marked improvement he was discharged from the hospital. The investigation disclosed no evidence to indicate the pilot had received medical treatment after 1955. It also revealed he had successfully passed second-class medical examinations between 1959 and 1965. (Records were not retained for the years prior to 1959.) Persons who knew the pilot did not indicate any observations of an unfavorable nature concerning his health. He was considered an energetic person. The copilot who flew with him on the first round trip flight on the day of the accident as well as on other occasions said Mr. Kelly was in excellent health and concerning the flight on the day of the accident said ". . . Mr. Kelly appeared to be in good health and good spirits." Other witnesses who saw him shortly before the accident flight said in effect he appeared to be his usual normal self.

Regarding the pilot's medical history, the professional analysis of an FAA flight surgeon at the public hearing was: "I suppose one would have to answer there is always a possibility of some medical incapacity. I find it a little difficult to project because most of the medical information . . . is some ten to twelve years old, and it seems apparent he was a pretty active pilot from that time up to the time of the accident, and while such incapacity could occur, it is a little difficult to accurately connect."

Pilot Kelly received his certificate of competency in the Lear Jet from an FAA inspector on September 2, 1965. Since The Flying Tiger Line Inc., (FTL) owned the aircraft and leased it to the Paul Kelly Flying Service, Inc., the chief pilot of FTL certified Paul Kelly as captain on Lear Jets for day, night, and instruments. The day before the accident Pilot Kelly made an extended cross-country flight, and retired at approximately midnight. He reported for work at 0730 on November 14.

David K. Faulkner, copilot, was 27 years of age. He held private pilot certificate No. 1636723, with an airplane single engine land rating. He was not instrument rated. He had accumulated about 160 flying hours of which approximately 24 hours were in the Lear Jet. He did not have a certificate of competency in the Lear Jet. His FAA first-class medical certificate was issued December 12, 1964, without limitations. This certificate was still valid as a second-class certificate at the time of the accident.

1 6 Aircraft Information

N243F, a Lear Jet Model 23, serial No. 23-063 was purchased by FTL on October 29, 1965, and at the time of the accident had accumulated approximately 43 flying hours. It was configured to accommodate six passengers and two crewmembers. The aircraft was serviced by FTL and leased to the Paul Kelly Flying Service, Inc. All periodic maintenance was accomplished by Lear Jet Corporation. Maintenance records indicated the aircraft had been maintained in accordance with FAA requirements. It was scheduled for a modification to the windshield defogging system on November 16, 1965.

The aircraft was equipped with two General Electric Company CJ-610-4 engines, installed as follows:

| <u>Position</u> | <u>Serial Number</u> | <u>Total Time</u> |
|-----------------|----------------------|-------------------|
| 1 | 241081 | 42.7 |
| 2 | 241085 | 42.7 |

The fuel on board was JP-1, which is approved for the Lear Jet, but it did not contain the required Phillips Anti-icing Additive PFA55MB concentration.

The gross weight of N243F at takeoff from Palm Springs was computed to be 11,649 pounds which was below the maximum allowable of 12,500 pounds. The center of gravity (c.g.) of 26 percent was within the allowable range of 16 to 31.5 percent.

1.7 Meteorological Information

The U. S. Weather Bureau (USWB) aviation area forecast issued by the Los Angeles office at 1045, for a 12-hour period, was in part as follows:

Coastal waters and inland to mountains multiple layers broken to overcast with intermittent light rain. Ceilings 2,000-4,000 feet lowering after 2100 to 1,200-2,000 feet. Tops generally 15,000 feet, but locally to above 20,000 feet. Visibilities 2-5 miles lowering to 1-3 miles after 2100. Light to locally moderate turbulence in clouds especially vicinity of mountains and over deserts.

At 1245, Airmet Alfa 7 was issued warning that terrain would be occasionally obscured above 4,000 feet, with conditions continuing beyond 1700.

Airmet Alfa 8, issued at 1630, amplified the earlier warning in part as follows:

Extreme Southern Nevada and Southern California interior regions terrain occasionally obscured above 3,500 feet by clouds and precipitation. Conditions continuing beyond 2100.

The 1700 USWB surface weather observation at Palm Springs was 3,000 feet scattered clouds, estimated 5,000 feet overcast, visibility 15 miles, light drizzle, temperature 57 degrees, wind calm, altimeter setting 30.02, ceiling lower west.

The last known weather briefing of the pilot occurred at 1301, when he was briefed on the current and forecast weather and winds aloft.

1.8 Aids to Navigation

There were no reported discrepancies with any of the radio navigation aids in the area.

1.9 Communications

There were no communications problems with the flight until they did not answer the Thermal FSS specialist, and there were no further transmissions from the flight.

1.10 Aerodrome and Ground Facilities

The Palm Springs Municipal Airport is approximately 2.5 miles east of Palm Springs, California, at an elevation of 448 feet. It is situated in an approximate 10-mile wide valley with terrain rising above 5,000 feet m.s.l. in all quadrants around the airport, except the southeast. In this direction the valley widens progressively into the low, flat terrain of the Imperial

Valley. The airport had no permanent tower; however, at the time of the accident a temporary FAA control tower was in operation. The tower had been set up to handle the heavy VFR traffic incident to an air show, and did not have the capability of handling IFR departures. Accordingly, pilots were receiving their IFR clearances from the Thermal FSS after departing Palm Springs.

1.11 Flight Recorder

The aircraft was not required to have a flight recorder, and there was none installed.

1.12 Wreckage

The aircraft crashed approximately 13 miles east of the Palm Springs Airport at a terrain elevation of 1,180 feet. Impact of the aircraft occurred on the relatively flat sand, rock, and gravel surface of a hilltop which was somewhat lower than the surrounding terrain. The initial impact made three distinct interconnected ground scars aligned on a 005-185 degree bearing. It was determined that the center scar was caused by the fuselage and engines, and the outer scars by the wing-tip fuel tanks. The aircraft attitude at impact was approximately 55 degrees nosedown, with a nearly vertical left bank. The top of the aircraft was to the west. The wreckage distribution pattern was fan-shaped in a northerly direction for an estimated distance of 2,500 feet. The dirt throwout was symmetrical to the east and west.

The landing gear, flaps and spoilers were determined to have been retracted at impact. Wreckage examination indicated that the aircraft was intact at impact, and there was no inflight fire or explosion. Those sections of the

flight control system which were not demolished were properly attached and safetied. The control cable separations were characteristic of tension overload. The balance tabs from both ailerons, and the adjustable aileron tab had separated but were found as complete surfaces. Damage to the electric trim actuator precluded determination of the adjustable tab setting at impact.

The rudder, with trim tab attached, was found as a complete unit. The rudder trim actuator arm was approximately in the neutral position.

The left horizontal stabilizer was severly broken up. The right horizontal stabilizer was relatively intact, except for the leading edge which was demolished. The stabilizer hinge point had separated from the supporting structure and was found as a complete unit. The hinge pin bearing surfaces operated smoothly. The stabilizer jackscrew setting was within approximately 0.5-degree of the aircraft nosedown stop. This equates to a trimmed speed regime of 300 knots.

There was no evidence of any disc failures in either the compressor or turbine sections of the engines. Both engines were rotating at impact.

The electrical system components were examined and there were no signs of malfunction or fire. Although the two solid state inverters were demolished, examination of the two attitude indicators revealed they were deformed and locked in a pitch attitude of 50-60 degrees nosedown. One instrument was sufficiently intact to establish that electrical power was on and the bank attitude was 90 degrees at impact.

1.13 Fire

There was a fan-shaped ground fire swath which resulted from fuel dispersal to the north of the impact craters.

1.14 Survival Aspects

This was a non-survivable accident. The circumstances of the crash precluded toxicological examination or autopsies of any occupants.

1.15 Tests and Research

None.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The pilot and copilot were both properly certificated, and met crew requirements for the operation but the copilot had minimal overall experience, and was not qualified as pilot in the Lear Jet, nor was he instrument rated.

The aircraft had been maintained in accordance with FAA regulations, and the gross weight and c.g. were within allowable limits. There was no evidence of inflight fire, explosion, or structural failure, and examination of the control system revealed no indication of malfunction. Consequently, it is believed that no malfunction of the aircraft or its systems was involved in the cause of the accident.

The wreckage distribution indicates a horizontal component of aircraft motion in a northerly direction. This wreckage pattern and the ground scars showing a near vertical bank and steep nosedown attitude of the aircraft indicate that it entered the final descent from a steep angle of bank,

and at impact there was little if any translational motion along its vertical axis. This evidence would result if the aircraft were in a coordinated spiral at impact or if it crashed after its nose dropped sharply from a steeply banked attitude with no turning component. In view of the foregoing, the final maneuver, clearly indicative of a loss of aircraft control, can only be attributed to either pilot incapacitation or to a form of spatial disorientation.

The Board is of the opinion that the weight of the available evidence discounts pilot incapacitation. In this regard it agrees with the professional opinion of the FAA Flight Surgeon that the remoteness of the pilot's medical problems, being some 10 to 12 years earlier, make connecting them with the accident difficult particularly with the series of satisfactory flight medical examinations since at least 1959. The Board considers these satisfactory examinations over the extended period convincing evidence that the pilot was in good health. It also believes that its view is additionally supported by the absence of any known medical treatment over these years and by the statements attesting to the pilot's good spirits and health by his copilot of prior flights including one on the day of the accident and by persons who talked to him just before the accident flight. Finally the apparent normal operation of the aircraft before, during and after takeoff until the moment of control loss tends in some degree to lessen the possibility of pilot incapacitation.

In view of the foregoing the Board believes that spatial disorientation is the more probable reason for the loss of control. Spatial disorientation is the inability of the pilot to determine his position relative to his environment. It is triggered by conflicting information from the physiological sensing elements of the body. Among the many factors which produce this phenomenon, two are of paramount importance in this instance:

- (1) Inadequate stimuli - the absence of visual reference, or even the reduction in quality, creates false sensations. This is particularly hazardous over snow, water, or other barren areas.
- (2) Division of attention - failure to establish a continuous source of attitude reference, either visual or instrument, increases the opportunity for conflict between the two.

The evidence shows that the flight was turning in darkness away from any populated area toward dark, cloud-shrouded, mountainous terrain when control was lost. Any drizzle or rain accumulation on the windscreen would have further reduced or possibly negated the usefulness of the few visual cues which were available. Paradoxically the aforementioned circumstances, which establish the prudence of flight by reference to instruments, also dictate the need for continuous lookout. The flight was restricted by topography and cloud cover to operation within the confines of a relatively small air-space. It is not known whether the pilot was aware of exactly how many other aircraft were in the vicinity, but he must have known there were

others. In any event, he was obviously committed to the complex situation requiring visual flight to avoid terrain and other aircraft, and he was confronted by circumstances which required instrument reference for proper attitude interpretation. Considering the copilot's inexperience and the adverse conditions for the high speed, low level flight, it is doubtful if the pilot relied on him for any appreciable assistance. Finally, it is significant to note that the pilot was completing his second consecutive day of extensive flight operations, with minimal rest intervening, and any fatigue experienced would have increased his susceptibility to disorientation.

2.2 Conclusions

(a) Findings

1. The aircraft was airworthy and the pilots properly certificated.
2. There was no mechanical failure of the aircraft, its systems powerplants, or components.
3. The flight was initiated at night in weather which was above the minimum conditions for VFR operations, but there was an overcast at 5,000 feet, with rainshowers and lower clouds obscuring the higher surrounding terrain.
4. The flight made a normal climbout and remained below the clouds.
5. There were other aircraft flying in the area awaiting IFR clearances.
6. The pilot was confronted with conditions requiring the division of his attention between instrument reference for proper attitude information and visual reference for terrain and aircraft avoidance.

7. The copilot met the crew requirements for the flight, but did not have sufficient piloting ability to appreciably assist the pilot under the existing conditions.

8. The aircraft went out of control from a cruise configuration and crashed in a 55-degree nosedown, vertical left bank attitude.

(b) Probable Cause

The Board determines that the probable cause of this accident was spatial disorientation of the pilot, resulting in a loss of control.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD.

/s/ JOSEPH J. O'CONNELL, Jr.
Chairman

/s/ OSCAR M. LAUREL
Member

/s/ JOHN H. REED
Member

/s/ LOUIS M. THAYER
Member

/s/ FRANCIS H. McADAMS
Member