Aviation Investigation Final Report

Location:	SAN SIMON, Arizona	**Accident Number:**	LAX94FA028
Date & Time:	October 27, 1993, 08:24 Local	**Registration:**	XBHOM
Aircraft:	PIPER PA-24-250	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

AT 0634 MST, THE PILOT FILED A VFR FLIGHT PLAN & RECEIVED WEATHER INFO FOR A ROUTE FROM EL PASO TO TUCSON. HE WAS ADVIZED OF 2 PIREPS REGARDING SEVERE TURBULENCE IN THE TUCSON AREA & OF AN AIRMET CONCERNING TURBULENCE BELOW 12000 FT. THE PILOT'S TAKEOFF & DEPARTURE APPEARED NORMAL, THEN THERE WAS NO FURTHER COMMUNICATION WITH THE AIRPLANE. WHILE EN ROUTE, AN IN-FLIGHT BREAKUP OF THE AIRCRAFT OCCURRED, BUT THERE WERE NO KNOWN WITNESSES. THE RIGHT OUTBOARD WING PANEL WAS FOUND ABOUT 2/10 MILE FROM THE MAIN WRECKAGE WITH EVIDENCE THAT IT HAD FAILED IN POSITIVE (UPWARD) LOADING. THE OUTBOARD 2/3 OF THE LEFT HORIZONTAL STABILIZER HAD SEPARATED, BUT WAS NOT FOUND; THERE WAS EVIDENCE THAT IT HAD FAILED DOWNWARD. A PARK RANGER NOTED THE PRESENCE OF A 'BLACK . . . DOME SHAPED' CLOUD OVER MOUNTAINS ABOUT 5 MI FROM THE CRASH SITE. IT WAS CAPPED WITH ANOTHER SMALLER CLOUD AT A HIGHER ELEVATION. THE NATIONAL WEATHER SERVICE HAD NOT ISSUED AN ADVISORY FOR SEVERE TURBULENCE, ALTHOUGH INFO FOR SUCH DETERMINATION EXISTED BEFORE THE FLIGHT.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE PILOT'S IMPROPER PLANNING/DECISION, AND HIS ALLOWING THE AIRPLANE TO EXCEED ITS DESIGN STRESS LIMITS, WHICH RESULTED IN OVERLOAD FAILURE OF THE RIGHT OUTBOARD WIND SECTION AND LEFT HORIZONTAL STABILIZER. FACTORS RELATED TO THE ACCIDENT WERE: THE ADVERSE WEATHER CONDITIONS, AND AN INADEQUATE HAZARDOUS WEATHER ADVISORY CONCERNING THE SEVERE TURBULENCE.

Findings

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER
Phase of Operation: CRUISE - NORMAL

Findings
1. (C) PLANNING/DECISION - IMPROPER - PILOT IN COMMAND
2. (F) HAZARDOUS WEATHER ADVISORY - INADEQUATE - NWS PERSONNEL
3. (F) WEATHER CONDITION - MOUNTAIN WAVE
4. (F) WEATHER CONDITION - TURBULENCE

Occurrence #2: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE

Findings
5. (C) DESIGN STRESS LIMITS OF AIRCRAFT - EXCEEDED - PILOT IN COMMAND
6. WING - OVERLOAD
7. STABILIZER - OVERLOAD

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Factual Information

HISTORY OF FLIGHT

On October 27, 1993, about 0824 mountain standard time (mst), a Mexico registered Piper PA-24-250, XBHOM, operated by the pilot, experienced an in-flight breakup and crashed into desert terrain about 10 nautical miles southwest of San Simon, Arizona. Visual meteorological conditions prevailed during the daytime personal flight. The airplane was destroyed during the breakup sequence and during a postimpact ground fire. The private pilot and passenger were fatally injured.

Prior to taking off, at 0634, the pilot filed a visual flight rules flight plan which indicated he planned to fly to the Ryan Airport near Tucson, Arizona. The pilot stated that he planned to fly via Columbus, Cochise, and Tucson.

The accident flight commenced from the El Paso International Airport, El Paso, Texas, on October 27, 1993, around 0727. The pilot's takeoff was uneventful, and he departed the airport's traffic area. All communications with the pilot were described as having been routine. There were no further communications with the pilot/airplane, and there were no witnesses to the accident.

Relatives of the pilot, who were familiar with the pilot's customary flying habits, reported that the pilot was very familiar with the route of flight between El Paso and Tucson. The relatives indicated that the pilot would typically file a flight plan. The pilot would not fly over Interstate Highway 10 or use railroad tracks for visual aids to navigation unless the flight visibility was poor. When the visibility was good, the pilot would fly via a direct route. After passing the New Mexico-Arizona state border, he would head for the area where the Cochise VORTAC (radio navigational aid) was located. Family members further reported that the location of the crash site (21 nautical miles northeast of Cochise) appeared consistent with the pilot having flown the customary "on course" route.

(All times used in this report are reported as mountain standard time, which was the time zone in use at the San Simon, Arizona, crash site. The local time zone used in El Paso, Texas, was mountain daylight time. When reviewing the meteorological data in the attached "Meteorological Factual Report," convert referenced universal coordinated time (UTC) to local mountain standard or mountain daylight time by subtracting 6 or 7 hours, respectively.)

The National Transportation Safety Board requested that the Federal Aviation Administration (FAA) examine its recorded radar data for evidence of aircraft tracks consistent with the accident airplane's departure time and proposed route of flight. Only one aircraft track was so identified.

An examination of that aircraft's track revealed that after departure the aircraft headed in a westerly direction and, during the period between 0808 and 0819, the aircraft proceeded on a westerly course at (transponder) altitudes between 5,500 and 5,600 feet. Between 0819:43 and 0823:18, the aircraft continued flying along a westerly track, and its altitude varied between 5,800 and 6,200.

The last transponder reinforced hit of this target occurred at 0823:18, at which time the aircraft was located at 32 degrees, 09 minutes, 06 seconds north latitude, by 109 degrees, 20 minutes, 55 seconds west longitude. At 0823:42, a primary target was observed to the west of the transponder target's last location. The primary target was located at 32 degrees, 09 minutes, 20 seconds north latitude, by 109 degrees, 21 minutes, 49 seconds west latitude. (For additional information, see the attached computer printout of radar track data from the FAA's Albuquerque Air Route Traffic Control Center.)

PERSONNEL INFORMATION

In November of 1951, the pilot was issued a Private Pilot certificate with an airplane single-engine land rating. The pilot also possessed a Mexican pilot's certificate, No. 1854. According to the FAA, the pilot applied for and was issued a Third-Class aviation medical certificate on October 26, 1993. On the pilot's application form he indicated having 6,800 total hours of flying experience, and having flown for 40 hours during the preceding 6-month period.

The pilot's personal flight record logbook was not provided to the Safety Board for examination. The pilot's recency of flight experience and currency were not confirmed. Family members reported that the pilot flew his airplane on a regular basis.

AIRCRAFT INFORMATION

Relatives of the pilot reported that the airplane's maintenance records were normally stored inside the airplane. Maintenance was performed at firms located in both Mexico and the United States. The relatives indicated they believed the airplane had received an annual inspection during the past year.

METEOROLOGICAL INFORMATION

At 0723, prior to the accident pilot's VFR takeoff, he requested the current Tucson weather. In pertinent part, the pilot was informed that in the Tucson area two pilots had reported experiencing severe turbulence while flying between 12,000 and 14,000 feet. The accident pilot was informed that an [AIRMET] advisory for [moderate] turbulence [below 12,000 feet] existed. The accident pilot indicated that he had received the advisory. The Safety Board staff meteorologist's review of weather data, including Geostationary Environmental Operation Satellite (GOES) visible images, showed the existence of atmospheric mountain wave activity in the San Simon area. Data indicating that the wave activity existed should have been

available to the National Weather Service (NWS) prior to the airplane's takeoff. According to the NWS, it did not forecast severe turbulence for the San Simon area. (For additional details, see the attached "Meteorological Factual Report.")

Following the accident, a park ranger who was located near the crash site reported that he had noted the presence of an unusual appearing "black" colored cloud. The ranger described the cloud as having a "dome shape," and it was capped with one higher elevation smaller cloud. The clouds were located over the peak of an 8,000 foot msl mountain and were estimated to have been within five miles of the crash site.

WRECKAGE AND IMPACT INFORMATION

Based upon an examination of the accident site and wreckage, the airplane was found to have broken apart in flight. Its fragmented structure was found to have crashed onto unpopulated Arizona Trust Land approximately 10 nautical miles southwest of the community of San Simon, Arizona. The ground elevation at the crash site was estimated between 4,400 feet and 4,600 feet mean sea level.

The main wreckage was found around 32 degrees, 09 minutes, 22.2 seconds north latitude, by 109 degrees, 21 minutes, 49.8 minutes west longitude. The wreckage principally consisted of the engine and propeller assembly, cockpit, flaps, the entire left wing, the inboard portion of the right wing, the right stabilator, and the vertical stabilizer with attached rudder.

The engine assembly was found about 4 feet beneath ground level in a circular shaped impact crater which had an estimated 10-foot diameter. The engine was observed oriented in an estimated 60- degrees nose-down attitude and was pointed in an easterly direction.

The left wing was found about 2 yards northeast of the crater, and the inboard portion of the right wing was located about 4 yards northwest of the crater. Both wings were found attached to the carry-through fuselage structure. The leading edges of both wings were observed accordioned in an aft direction, and the front surface of the spar was exposed (see photographs).

The component located farthest away from the main wreckage (and nearest to the last recorded radar hit), was a 5.2-foot long inboard portion of the right aileron. It was found about 2/10 of a mile southeast of the main wreckage at approximately 32 degrees, 09 minutes, 12 seconds north latitude, by 109 degrees, 21 minutes, 42.6 seconds west longitude. The aileron was observed buckled in an upward direction. The aileron was found without the shaft portion of its push-pull control rod. The outboard 1.5-foot long outboard portion of the right aileron was found an estimated 150 yards southwest of the main wreckage. The component located farthest to the west of the main wreckage was the outboard 6.25-foot long span of right wing. It was found about 1/10 of a mile west of the main wreckage at approximately 32 degrees, 09 minutes, 22.2 seconds north latitude, by 109 degrees, 21 minutes, 58.2 minutes west longitude. The wing was observed buckled in an upward direction. No evidence was noted of

corrosion or repair in the area where the right wing spar was observed broken.

The outboard 2/3 of the left stabilator was not located. The inboard 1/3 of the stabilator was found attached to the tail and was partially consumed by fire. One partially melted pin-and-hinge assembly was found in the burned wreckage near the tail. The fire damaged pin-and-hinge assembly appeared to match similar assemblies found intact on the right stabilator. The entire right stabilator was found attached to the tail and was found buckled in a downward direction. The antiservo tab, along with its three hinges, was found attached to the stabilator.

One propeller blade was found broken from the engine at its attachment hub assembly. The blade was found along side the engine in the impact crater. The blade was observed bent into an "S" shape, and bore scratches over its cambered surface throughout its entire span. The tip portion of the second propeller blade was observed above ground level, and it appeared to have remained attached to the engine.

The top spark plug from the No. 4 cylinder was removed and examined. No oil was observed in the plug, and the electrode was oval in shape.

FIRE

Evidence of a postimpact ground fire was only observed in the immediate vicinity of the main wreckage. The entire cockpit was found destroyed by fire as were portions of the empennage, including the baggage compartment, and the inboard portion of the left stabilator. None of the structure which was found separated from the airplane bore evidence of soot or heat damage.

MEDICAL AND PATHOLOGICAL INFORMATION

The physician who issued the pilot his last FAA aviation medical certificate reported to the Safety Board that the pilot had appeared in good health, did not smoke, and was a former athlete. Although several years ago the pilot had undergone coronary bypass surgery, he had not experienced any recent physical problems. In summary, the pilot appeared to be medically fit.

On October 28, 1993, an autopsy was performed by the Cochise County Medical Examiner's Office in Sierra Vista, Arizona. The autopsy did not disclose any evidence of physical incapacitation or impairment that would have adversely affected the pilot's ability to operate the aircraft.

In accordance with an FAA contract, the Armed Forces Institute of Pathology (AFIP) performed toxicology tests on the pilot. The AFIP reported finding no evidence of cyanide, ethanol, or other drugs.

TESTS AND RESEARCH

Metallurgy Report

The right aileron's push-pull control rod was observed broken at its threaded shank on the outboard portion of its attachment end to the aileron. The remaining control rod, which was found attached to the aileron bell crank on the wing, was removed from the wing structure. Both portions of the control rod were submitted to the Safety Board's Metallurgical Laboratory in Washington, D.C., for analysis of the fracture surface.

On February 23, 1994, the laboratory's director verbally reported that the submitted control rod had been optically examined. The director indicated that no evidence was found of fatigue. He reported that the fracture appeared to have resulted from an over-stress condition.

In-flight Breakup Sequence Report

Based upon Piper Aircraft Corporation wing design specifications, the Safety Board's field measurements of the right wing's point of separation, and correspondence received from the FAA's Atlanta Aircraft Certification Office, the wing was found to have broken at a location outboard of the spar splice area.

Regarding the probable failure mode of the wing and stabilator, the FAA Certification Office representative provided the following statement, summarized in part, as follows: Under a positive wing overload condition, the stabilator will sustain heavy down-loading until the wing breaks and unloads the stabilator. Under these conditions, the stabilator will be deflected downward. After the wing failure occurs, the stabilator should have permanent wrinkles in the bottom skin. One or both sides of the stabilator could separate from the fuselage.

ADDITIONAL INFORMATION

Except for the airplane's right aileron control rod and rod to wing attachment assembly, all located wreckage was verbally released to the pilot's son while at the crash site. The control rod and attachment assembly components were released to the pilot's son on June 6, 1994.

Pilot Information

Certificate:	Private	**Age:**	59,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Unknown
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	October 26, 1993
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	7000 hours (Total, all aircraft), 1000 hours (Total, this make and model), 30 hours (Last 90 days, all aircraft), 8 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	PIPER	**Registration:**	XBHOM
Model/Series:	PA-24-250 PA-24-250	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:		**Serial Number:**	PA-24-1913
Landing Gear Type:	Retractable -	**Seats:**	4
Date/Type of Last Inspection:	March 11, 1993 Unknown	**Certified Max Gross Wt.:**	2800 lbs
Time Since Last Inspection:	65 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3200 Hrs	**Engine Manufacturer:**	LYCOMING
ELT:		**Engine Model/Series:**	O-540-A1D5
Registered Owner:	JOSEPH AND RULON WAGNER	**Rated Power:**	250 Horsepower
Operator:	JOSEPH W. WAGNER	**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:		**Distance from Accident Site:**	
Observation Time:		**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered / 3000 ft AGL	**Visibility**	30 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots / 20 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	135°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	EL PASO , TX (ELP)	**Type of Flight Plan Filed:**	VFR
Destination:	TUCSON , AZ (RYN)	**Type of Clearance:**	
Departure Time:	08:27 Local	**Type of Airspace:**	

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	31.999475,-109.210838(est)

Administrative Information

Investigator In Charge (IIC):	Pollack, Wayne
Additional Participating Persons:	MARION L CHILDRES; SCOTTSDALE , AZ CHARLES LITTLE; CHINO HILLS , CA
Original Publish Date:	September 30, 1994
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=28504