



Aviation Investigation Final Report

Location:	PEARBLOSSOM, California	Accident Number:	LAX94FA323
Date & Time:	August 13, 1994, 13:31 Local	Registration:	N135FF
Aircraft:	LOCKHEED C-130A	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	3 Fatal
Flight Conducted Under:	Part 137: Agricultural		

Analysis

While in level flight, the airplane's right wing separated and, during the separation sequence, wing fuel ignited. Subsequent laboratory examination of right-side, center-wing fragments revealed two fatigue cracks that propagated to overstress fractures. One of the cracks was within the underside wing skin below a doubler, and the other was within the doubler itself. The total size and origin of the fatigue regions could not be determined due to damage to fracture surfaces and a lack of available material. The airplane was delivered new to the U.S. Air Force in December 1957 and was retired from military service in 1986. In May 1990, the FAA issued a restricted-category special airworthiness certificate authorizing the airplane to dispense aerial fire retardant. At the time of the accident, the airplane had a total of 20,289 flight hours, 19,547 of which were acquired during its military service. The inspection and maintenance programs used by the operator, which were based on military standards, included general visual inspections for cracks but did not include enhanced or focused inspections of highly stressed areas, such as the wing sections, where the fatigue cracks that led to those accidents were located. The operator did not possess the engineering expertise necessary to conduct studies and engineering analysis to define the stresses associated with the firefighting operating environment and to predict the effects of those stresses on the operational life of the airplanes.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: the inflight failure of the right wing due to fatigue cracking in the underside right wing skin and overlying doubler. A factor contributing to the accident was inadequate maintenance procedures to detect fatigue cracking.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: CRUISE

Findings

1. WING - FAILURE, TOTAL
2. (C) WING, SKIN - FATIGUE
3. (F) MAINTENANCE, INSPECTION - INADEQUATE - COMPANY/OPERATOR MANAGEMENT

Occurrence #2: LOSS OF CONTROL - IN FLIGHT

Phase of Operation: DESCENT - UNCONTROLLED

Findings

4. AIRCRAFT CONTROL - NOT POSSIBLE

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: DESCENT - UNCONTROLLED

Findings

5. TERRAIN CONDITION - MOUNTAINOUS/HILLY

Factual Information

HISTORY OF FLIGHT

On August 13, 1994, at 1331 Pacific daylight time, a civilian Lockheed C-130A, N135FF, operating as Tanker 82, impacted mountainous terrain near Pearblossom, California. The airplane was destroyed and the crew of three were fatally injured. The flight originated from Hemet-Ryan Airport (HMT), Hemet, California, at 1310. Visual meteorological conditions prevailed at the time of the accident, and a company flight plan was filed for the operation. The airplane was owned by Aero Firefighting Service Company, Inc., and operated by the U.S. Forest Service as a public use aircraft.

According to U.S. Forest Service personnel, the airplane was responding to a fire near the Tehachapi Mountains at the request of the California Department of Forestry. The crew was receiving flight following from High Desert TRACON (Joshua Approach Control) and the airplane's encoding altimeter was indicating 7,800 feet msl. A review of air traffic control communication tapes revealed two unidentified transmissions; one of an unintelligible squeal, followed by a brief expletive at 1331.

According to some witnesses, the airplane had been in level flight when a fireball and/or explosion occurred in the vicinity of the left-wing, inboard engine, followed by separation of the left wing. Other witnesses observed the right engine "blow," followed by a second explosion; and the airplane turned to the right. Witnesses further noted that the airplane "rolled," "rotated clockwise," "arc[ed] down to the right," and "barrel rolled" after the fire/explosion.

Witnesses also stated that the ground impact of the main wing and fuselage resulted in an additional fireball and explosion, and one witness stated that the smoke from the ground fire rose vertically in an undisturbed column.

PERSONNEL INFORMATION

The pilot, copilot, and flight engineer were rated in the airplane. A review of the pilot/operator accident report prepared by the operator revealed that the crew had current flight experience in the accident airplane. According to FAA inspectors, at the time of the accident, the flight was being operated in accordance with applicable regulations.

AIRCRAFT INFORMATION

The airplane was delivered to the U.S. Air Force in December 1957. In April 1959, it was modified to become a C-130A-II, to perform an electronic reconnaissance mission. In September 1964, it was de-modified and reconfigured to a "near standard C-130A" and

transferred to the Air National Guard. In August 1986, the airplane was transferred to Davis-Monthan Air Force Base for storage. In June 1988, it was removed from storage. In June 1990, modification as a restricted category firefighting aircraft was approved per FAA Form 337. A Restricted Category Special Airworthiness Certificate, which authorized aerial dispensing of fire retardant, was issued in May 1990.

A review of maintenance records revealed that on April 22, 1994, the airplane was returned to service after a progressive inspection cycle. The inspection program was an FAA approved and authorized aircraft inspection program (AAIP). The airplane completed an eddy current inspection in April 1991. All parts tested met the inspection standard. Investigators estimated that at the time of the accident, the airplane was within weight and balance limitations and had sufficient fuel to complete the planned flight.

On July 17, 1994, (the most recent record available) the operator completed a Day Off Inspection (seven-day check.) The records of subsequent checks were onboard the airplane and were destroyed.

METEOROLOGICAL INFORMATION

According to recorded information from the Bureau of Land Management's Automatic Lightning Detection System (ALDS), there was lightning activity in the area of the accident site at the time of the crash. Witnesses, both on the ground and in the air near the accident site, reported that the airplane was clear of clouds and that there was no visible electrical activity at the time of the accident.

AIDS TO NAVIGATION

The impact site was located along an imaginary line connecting Hemet-Ryan Airport and Tehachapi, California. At 1330, the pilot reported to Joshua Approach Control that he intended to "go straight for the next 42 miles."

According to U.S. Forest Service officials, dispatch information included magnetic direction to the fire and distance from the departure airport, along with the latitude and longitude of the fire's location. The operator reported that the crew was familiar with the area and that the airplane was equipped with a global positioning system (GPS).

COMMUNICATIONS

After takeoff, the crew initiated two-way radio contact with Ontario Approach Control. The crew responded to radio calls without delay or difficulty until 1330 (about 1.5 minutes before the accident.) All communications were routine with no indication of any in-flight problems.

WRECKAGE AND IMPACT INFORMATION

The wreckage was located in the San Gabriel Mountains, on the north face of Pleasant View Ridge, near Pechner Canyon, about the 6,500-foot level. The airplane's right wing was separated from the main wreckage.

A total of six center wing pieces, five pieces of the upper wing surface and one piece of stringer, were found approximately 1,000 feet in advance of the separated main wing. Numerous pieces of 1-inch-thick, yellow styrofoam, a green interior wing panel, and a torn portion of a fuel cell liner were also found in the same general area. None of the debris had been involved in the resulting ground fire. The styrofoam material was reported to have been located beneath the auxiliary fuel cell. Portions of the styrofoam exhibited evidence of surface charring. Light sooting of the wing pieces was consistent with normal service.

Crush on the separated right wing components indicated a near-level attitude at impact. The identification was made by serial numbered components recorded as being located on the right side of the airplane. Examination of the debris revealed an outline of a burned and melted main wing structure, extending from the right wing tip to a section inboard of the No. 3 engine nacelle. The ground fire melted or consumed all fracture surfaces on the inboard portion.

A teardown inspection of the No. 3 and 4 engines revealed no evidence of rotational scoring. Although the supporting structure was fractured or consumed by fire, the engines retained their relative positions on the right wing. The persistent odor of ammonia was detected in and about the No. 3 engine.

Both the No. 3 and 4 propellers and hubs were found separated from their engines. The No. 3 propeller was found at -10 degrees (full reverse) while the No. 4 propeller was found at 67 degrees, and its dome stop ring was found to be almost in the feather position. There was no bending, twisting, or leading edge damage on any blade from either the No. 3 or No. 4 hubs. Two blades from the No. 3 hub had been consumed by fire up to the blade root.

The main fuselage and remaining left wing impacted rising terrain. The impact resulted in major structural collapse and disintegration, and a fire.

The cockpit area was identified, but efforts to access the interior portion were unsuccessful. Attempts at an aerial recovery of the cockpit were also unsuccessful and resulted in disintegration of the structure.

The No. 1 and 2 engines were recovered, and both exhibited evidence of rotational scoring. Both engines were displaced from their position relative to the left wing. Crush of the engine cases indicated a near 90-degree terrain impact angle on both engines.

The No. 1 and 2 propellers and hubs were separated from the engines. None of the No. 1 or 2 propeller components were recovered.

MEDICAL AND PATHOLOGICAL INFORMATION

There was no autopsy or toxicological examination of any of the crewmembers.

ADDITIONAL INFORMATION

The wreckage was released to a representative of the U.S. Forest Service on October 17, 1995. On November 16-17, 2003, subsequent to two other fire tanker accidents, the wreckage was re-examined at the accident site. Sections of the center and right wings were removed, and transported to the Safety Board Materials Laboratory for further examination.

According to the Laboratory's factual report, three underside sections of the center and right wings, extending between center wing section (CWS) 180R to CWS 220R (just outboard the "rainbow fitting"), were received. Chordwise, the sections included material from stringers 14 through 20. Much of the material was blackened, and displayed extensive heat damage.

A visual examination of the fracture surfaces revealed that most had features consistent with overstress separation. However, on one center wing section, at CWS 186R, two fracture regions displayed thumbnail patterns, indicative of fatigue, and crack arrest marks that extended from the thumbnail regions. Both fatigue regions propagated at an approximately 15-degree angle to the chord.

The first fatigue region was found in lower wing skin, on a flat, 90-degree plane relative to the skin surface, and extended from a rivet hole between stringer 14 and 15, aft for about 0.6 inch, before transitioning to overstress. The region had been covered by a 9.6-inch-wide doubler that extended from the forward edge of stringer 14 to the aft edge of stringer 15.

The fatigue region forward of the rivet hole was not available for examination. The regions aft of the fatigue region, up to stringer 20, displayed features consistent with overstress. The rivet hole from which the fatigue region initiated appeared to have been created when the doubler was attached to the wing structure. Similar rivet holes were not found between other stringers.

Scanning electron microscope examination of the fatigue region revealed thumbnail-shaped arrest marks, with half-moon-shaped regions in between. The fine features on the fracture face were obliterated by fire and environmental damage.

Energy dispersive spectroscopy revealed that the area adjacent to the fatigue region had a composition consistent with 7075 aluminum with the addition of calcium.

Skin thickness in the fatigue region was 0.092 inch, and thickness of the doubler was approximately 0.063 inch.

The second fatigue region was found on a 45-degree slant plane in the doubler, adjacent to the skin panel fatigue region. The region was 0.8 inch in length, and displayed beach marks consistent with fatigue propagation aft, similar to the other fatigue region.

The fracture surface aft of the fatigue region exhibited features consistent with overstress. The fracture surface forward of the fatigue region (a region approximately 0.95 inch in length) was found on a flat, 90-degree plane relative to the surface of the doubler; however, the fracture features were obliterated.

According to Lockheed Study LG81ER0148, the forward underside region of the center wing, at CWS 185.5, was known to be susceptible to fatigue. However, the location was slightly aft of the area examined. In addition, the study cited that the critical size for a crack growing in the wing skin alone was 1.72 inches, while the critical size for a crack growing in the wing skin and stringer together was 0.86 inch.

Pilot Information

Certificate:	Airline transport; Commercial	Age:	61, Male
Airplane Rating(s):	Single-engine land; Multi-engine land; Multi-engine sea	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	Yes
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	April 8, 1994
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	11000 hours (Total, all aircraft), 2000 hours (Total, this make and model), 8000 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LOCKHEED	Registration:	N135FF
Model/Series:	C-130A C-130A	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Restricted (Special)	Serial Number:	56-540
Landing Gear Type:	Retractable - Tricycle	Seats:	3
Date/Type of Last Inspection:	August 7, 1994 AAIP	Certified Max Gross Wt.:	120000 lbs
Time Since Last Inspection:	10 Hrs	Engines:	4 Turbo prop
Airframe Total Time:	20300 Hrs	Engine Manufacturer:	ALLISON
ELT:	Installed	Engine Model/Series:	T-56-A-9D
Registered Owner:	AERO FIREFIGHTING SVC CO INC	Rated Power:	3750 Horsepower
Operator:	JAMES A. VENABLE	Operating Certificate(s) Held:	
Operator Does Business As:	HEMET VALLEY FLYING SERVICE	Operator Designator Code:	RPEG

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	PMD ,2543 ft msl	Distance from Accident Site:	16 Nautical Miles
Observation Time:	12:59 Local	Direction from Accident Site:	315°
Lowest Cloud Condition:	Clear	Visibility	50 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	/ None	Turbulence Type Forecast/Actual:	/
Wind Direction:	0°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	39°C / 10°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	HEMET (HMT)	Type of Flight Plan Filed:	Company VFR
Destination:		Type of Clearance:	None
Departure Time:	13:12 Local	Type of Airspace:	Class G

Airport Information

Airport:		Runway Surface Type:	
Airport Elevation:		Runway Surface Condition:	
Runway Used:	0	IFR Approach:	
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	3 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:		Aircraft Fire:	In-flight
Ground Injuries:	N/A	Aircraft Explosion:	In-flight
Total Injuries:	3 Fatal	Latitude, Longitude:	34.389316,-117.740646(est)

Administrative Information

Investigator In Charge (IIC):	Crispin, Robert
Additional Participating Persons:	WILLIAM E BANKS, JR.; VAN NUYS , CA MICHAEL W LYNN; ONTARIO , CA WESLEY D WARDALL; MATHER , CA DARYL L SHIPPY; HEMET , CA
Original Publish Date:	December 19, 1995
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=28548

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).