Aviation Investigation Final Report

Location:	COLUSA, California	**Accident Number:**	LAX94LA046
Date & Time:	November 13, 1993, 19:30 Local	**Registration:**	N5723B
Aircraft:	CESSNA 182	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	3 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

THE AIRPLANE SUSTAINED A TOTAL LOSS OF POWER WHEN THE PILOT WAS DESCENDING TO A LOWER ALTITUDE DURING A NIGHT VFR FLIGHT. THE AIRPLANE'S ALTITUDE WAS INSUFFICIENT TO MAKE THE CLOSEST AIRPORT. THE PILOT TURNED ON THE LANDING LIGHTS AND ELECTED TO LAND IN AN OPEN FIELD. THE PILOT OBSERVED SOME POWER LINES CROSS HIS FINAL APPROACH PATH. HE ATTEMPTED TO MANEUVER BENEATH THE POWER LINES, BUT WAS UNSUCCESSFUL. THE AIRPLANE CLIPPED THE LINES AND CRASHED. THE ENGINE EXAMINATION DISCLOSED THAT THE LAST MAINTENANCE FACILITY TO OVERHAUL THE ENGINE FAILED TO NITRIDE AND HARDEN THE CAM GEARS AS REQUIRED. THE CAM AND CRANKSHAFT GEARS FAILED IN FATIGUE.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: was the poor major overhaul conducted by maintenance personnel by failing to properly service the cam shaft. The camshaft gears fatigue which led to its ultimate failure, the dark night conditions, and the power lines were factors in this accident.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: DESCENT - NORMAL

Findings

1. (F) ENGINE ASSEMBLY,CAMSHAFT - FAILURE,TOTAL
2. (F) ENGINE ASSEMBLY,CAMSHAFT - FATIGUE
3. (C) MAINTENANCE,OVERHAUL,MAJOR - POOR - OTHER MAINTENANCE PERSONNEL

Occurrence #2: FORCED LANDING
Phase of Operation: DESCENT - EMERGENCY

Occurrence #3: IN FLIGHT COLLISION WITH OBJECT
Phase of Operation: MANEUVERING

Findings
4. (F) OBJECT - WIRE,TRANSMISSION
5. (F) LIGHT CONDITION - DARK NIGHT

Factual Information

On November 13, 1993, at 1930 hours Pacific standard time, a Cessna C-182, N5723B, clipped a power line and collided with a ditch while executing an emergency landing near Colusa, California. The emergency landing was precipitated by a total loss of engine power. The pilot was conducting a visual flight rules personal flight to Redding, California. The airplane, operated by the pilot/co-owner, was substantially damaged. The certificated private pilot and two passengers were not injured. Night visual meteorological conditions prevailed. The flight originated at Los Banos, California, at 1730 hours.

The pilot stated that about one minute after changing cruise altitude from 8,500 feet mean sea level (msl) to 6,500 feet msl, the engine slowly lost rpm until the engine quit. The pilot said that he used carburetor heat when he reduced the throttle during the descent.

The pilot noted in the Pilot/Operator Aircraft Accident Report, NTSB Form 6120.1/2, that he was receiving visual flight rules flight following from Oakland Air Route Traffic Control Center when he experienced the loss of power. The local controller provided him with a "...bearing, distance and radio frequency..." of the Colusa County Airport. The pilot said that the airplane's altitude was insufficient to make the airport. He then used his landing light to select a landing area.

While on final approach to the landing area, the pilot saw power lines and turned the airplane to avoid a collision. The airplane clipped the wires and came to rest in a ditch.

Mr. Peter Wilhelmson, Aviation Safety Inspector, Federal Aviation Administration (FAA), Sacramento [California] Flight Standards District Office, supervised the engine examination. Inspector Wilhelmson said that the engine was prepared for a post accident run on November 18, 1993. A mechanic at Faith Aircraft Salvage, Sacramento, California, attempted to conduct an engine operational test.

According to Inspector Wilhelmson, the mechanic attempted to run the engine, but was unsuccessful. The external examination revealed that the numbers 1,4,5, and 6 cylinders had no compression, but the numbers 2 and 3 cylinders had compression.

Inspector Wilhelmson instructed Faith Salvage personnel to send the engine to Chuck's Aircraft Service, San Carlos, California, for further disassembly and internal analysis. Inspector Wilhelmson said that he did not observe any physical damage to the engine or the accessories.

When the mechanic removed the oil sump, Inspector Wilhelmson found two cam gear teeth. Five gear teeth were missing from the cam gear as viewed from the rear and going

counterclockwise. The teeth were cleanly broken off at the tooth root. The five remaining teeth were found ground away at different degrees of severity, continuing counterclockwise. Additionally, the crankshaft gear teeth were found stripped/damaged to the same level of severity.

The cam gear, crankshaft gear, and various pieces of gear teeth were examined at the National Transportation Safety Board Materials Laboratory, Washington, D.C. The metallurgist reported that the cam gear teeth failed in fatigue. The examination also showed several notches above the gear teeth flanks. A detailed optical examination of the portion of the tooth of the flanks showed multiple grinding marks.

According to a representative of Teledyne Continental Motors (TCM), the gear is specified to have a quenched and tempered microstructure with a core hardness of HRC 28 to 32. The gear must also have a nitrided case with a minimum surface hardness of 69 HR30-N. The metallurgist reported that the gear contained no evidence of a hardened layer on the surface of the gear, including the teeth roots.

A microhardness traverse test conducted by the metallurgist showed a relatively uniform hardness from the surface toward the interior. The hardness results are consistent with a component that did not contain a hardened surface layer.

Safety Board investigators did not recover the airplane's engine logbook. The pilot reported that the engine had accrued 560 flight hours since its last major overhaul. He also said the last annual inspection was performed on July 7, 1993; the airplane/engine accrued 66 flight hours since the annual inspection.

Pilot Information

Certificate:	Private	**Age:**	43,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	December 9, 1992
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	
Flight Time:	221 hours (Total, all aircraft), 186 hours (Total, this make and model), 221 hours (Pilot In Command, all aircraft), 18 hours (Last 90 days, all aircraft), 6 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	CESSNA	**Registration:**	N5723B
Model/Series:	182 182	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	33723
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	July 7, 1993 Annual	**Certified Max Gross Wt.:**	2550 lbs
Time Since Last Inspection:	66 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	2348 Hrs	**Engine Manufacturer:**	CONTINENTAL
ELT:	Installed, not activated	**Engine Model/Series:**	O-470-L
Registered Owner:	KEN SMITH/MIKE WILBER	**Rated Power:**	230 Horsepower
Operator:		**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:**	Night/dark
Observation Facility, Elevation:	MYV	**Distance from Accident Site:**	
Observation Time:	18:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	15 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	330°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29 inches Hg	**Temperature/Dew Point:**	13°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LOS BANOS (LSN)	**Type of Flight Plan Filed:**	None
Destination:	REDDING (O85)	**Type of Clearance:**	None
Departure Time:	17:30 Local	**Type of Airspace:**	Class G

Airport Information

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

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	2 None	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 None	**Latitude, Longitude:**	39.269348,-122.050178(est)

Administrative Information

Investigator In Charge (IIC):	Llorente, A.
Additional Participating Persons:	PETE WILHELMSON; SACRAMENTO , CA
Original Publish Date:	September 26, 1994
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=28600