Aviation Investigation Final Report

Location:	Jean, Nevada	**Accident Number:**	LAX08LA027
Date & Time:	November 8, 2007, 19:37 Local	**Registration:**	N3627B
Aircraft:	Beech A36	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The airplane lost engine power while in cruise flight on a dark night. The pilot had been in contact with the local area Terminal Radar Approach Control (TRACON) facility and reported the situation to the controller. The pilot indicated that he was in-between airports and did not want to risk a turn back to the departure airport due to the dark night and mountainous terrain conditions. After reporting the power loss, the pilot lost radio contact with the controller and decided to attempt a landing on the desert floor. The pilot landed the airplane gear up and struck desert shrubbery, which caused structural damage to the airplane. The pilot stated that the engine sounded as if it had lost a cylinder or a valve and it was running "weakly." A review of the airplane's logbooks revealed that the airplane had flown 14 hours since the last 100-hour/annual inspections. The factory-remanufactured engine had been installed on June 15, 2001, and had a total time of 717 hours. An engine teardown was performed and investigators noted that several camshaft gear teeth were missing, some of which were found in the oil sump. A metallurgical examination of the camshaft gear and teeth revealed signatures consistent with normal wear. Many of the surfaces on the camshaft gear had been damaged due to continued operation after the teeth separation. A fracture surface at the site of a missing tooth showed evidence of fatigue initiating at the surface. The metallurgist noted surface marks at the root on both sides of each tooth. Hardness was tested between the gear teeth on both parts and was found to meet component specifications based on the R30N scale.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of engine power as a result of a fatigue failure of the camshaft gear teeth. Contributing to the accident were the dark night lighting conditions and the rough, uneven

terrain the airplane encountered during the forced landing.

Findings

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

Findings
1. (C) ENGINE ASSEMBLY,CAMSHAFT - FATIGUE
2. (C) ENGINE ASSEMBLY,CAMSHAFT - FAILURE

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

Findings
3. (F) LIGHT CONDITION - DARK NIGHT

Occurrence #3: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
4. (F) TERRAIN CONDITION - ROUGH/UNEVEN

Factual Information

HISTORY OF FLIGHT

On November 8, 2007, at 1937 Pacific standard time, a Beech A36, N3672B, experienced a loss of engine power and made a forced landing on a desert floor about 3 miles northeast of the Jean Airport (0L7), Jean, Nevada. The owner/pilot operated the airplane under the provisions of 14 Code of Federal Regulations Part 91, as a personal cross-country flight. The airplane sustained structural damage to the firewall and fuselage areas. The private pilot and one passenger were not injured. Visual meteorological conditions prevailed for the flight that departed Mc Carran International Airport (LAS), Las Vegas, Nevada, about 1845, with a planned destination of Phoenix Deer Valley Airport (DVT), Phoenix, Arizona. Visual meteorological conditions prevailed for the flight and no flight plan had been filed.

According to the pilot, prior to departure, he had refueled the airplane; the left fuel tank was "full," and the right fuel tank was 3/4 full "to the tabs." After departure, he requested flight following through LAS Terminal Radar Control (TRACON). When the engine began to lose power, he reported the situation to LAS TRACON. The pilot stated that there was a smell of fuel in the cockpit. While conducting the emergency procedures, he noted that the airplane was losing altitude faster than he expected. Mountains surrounded the general area, and the engine was "running so badly," he did not want to chance a turn back toward Henderson, Nevada, where a nearby airport was located. The pilot stated that it was a dark night, and he chose an area to make a gear up landing. The pilot reported that the engine sounded as if it had "lost a cylinder or valve," and it was "running weakly."

Las Vegas TRACON lost radar and radio contact with the pilot at 1937.

AIRCRAFT INFORMATION

The 1980 single-engine Beech A36 (Bonanza), had a total time of 4,451.4 hours at the time of the accident. The airplane was returned to service after an annual inspection on September 3, 2007. The pilot reported a total of 14 flight hours flown since the annual inspection. Total time on the airframe at the annual inspection was 4,437.4 hours.

A 2001 Teledyne Continental Motors (TCM) IO-550-B43 engine, serial number 297340-R, had been installed on the airframe. The factory remanufactured engine was installed on June 15, 2001. The pilot reported a total time of 717 hours on the engine, with 14 hours since the last inspection. The last 100-hour inspection had been completed on September 3, 2007, at a total time of 703 hours.

TESTS AND RESEARCH

Investigators conducted an external visual inspection of the engine and found no obvious mechanical problems. They prepared the engine for a ground run. A fuel supply was connected to the right fuselage fuel line, and they attempted to start the engine. Several unsuccessful attempts were made to start the engine, at which point the investigators opened the fuel line to the servo and engaged the starter. They observed fuel streaming from the fuel line.

Investigators were not able to start the engine and began to inspect the engine further. The top spark plugs were removed; the spark plug electrodes exhibited normal operation signatures. Manual rotation of the crankshaft was attempted via the accessory side of the engine. Thumb compression was not obtained. Investigators then removed the rocker box covers in order to view the intake and exhaust rocker valve movement, and manually rotated the engine again. They noted no movement of any of the valves.

Investigators removed the starter adapter and observed the camshaft gear had several missing teeth. The engine was shipped to the manufacturer in Mobile, Alabama, for a teardown examination.

On February 6, 2008, the engine was inspected at the manufacturer under the auspices of the Safety Board. TCM personnel bench tested the magnetos, throttle body and fuel control, the fuel manifold valve, and the fuel pump, with no discrepancies noted. They found no discrepancies within the fuel system.

TCM personnel removed the accessory section, which revealed missing camshaft gear teeth; 16 gear teeth were missing. The camshaft lobes exhibited normal operating signatures. TCM personnel drained 2.5 gallons of oil from the sump, which contained various engine pieces including camshaft gear teeth.

All six piston heads exhibited valve strike signatures, but had no other discrepancies. The intake and exhaust valve faces and seats exhibited full seat contact signatures. The intake and exhaust valve guides as well as the rocker arms and shafts exhibited normal wear.

The crankshaft gear and camshaft gear were submitted to the TCM Materials and Processes Laboratory. The metallurgist reported that the crankshaft gear displayed signs of normal wear, and was undamaged. Many of the surfaces on the camshaft gear had been damaged due to continued operation. A fractured surface at the site of a missing tooth showed evidence of fatigue initiating at the surface. The metallurgist noted surface marks at the root on both sides of each tooth. Hardness was tested between the gear teeth on both parts and was found to meet requirements based on the R30N scale.

Pilot Information

Certificate:	Private	**Age:**	66,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	June 1, 2007
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	September 1, 2007
Flight Time:	3467 hours (Total, all aircraft), 756 hours (Total, this make and model), 3410 hours (Pilot In Command, all aircraft), 12 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N3627B
Model/Series:	A36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E1707
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	September 1, 2007 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	14 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4451.4 Hrs at time of accident	**Engine Manufacturer:**	Teledyne Continental
ELT:	Installed, activated, aided in locating accident	**Engine Model/Series:**	IO-550-B43
Registered Owner:	Fin Plan Air Service LLC	**Rated Power:**	300 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Night/dark
Observation Facility, Elevation:	HND,2492 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	19:56 Local	**Direction from Accident Site:**	220°
Lowest Cloud Condition:	Few / 18000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 25000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	250°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.95 inches Hg	**Temperature/Dew Point:**	21°C / 0°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	LAS VEGAS, NV (LAS)	**Type of Flight Plan Filed:**	None
Destination:	Phoenix, AZ (DVT)	**Type of Clearance:**	VFR flight following
Departure Time:	18:45 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	35.754165,-115.26667

Administrative Information

Investigator In Charge (IIC):	Cornejo, Tealeye
Additional Participating Persons:	Leslie Spahn; Federal Aviation Administration; Las Vegas, NV Greg Schmidt; Teledyne Continental Motors; Mobile, AL
Original Publish Date:	December 24, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=67065