Aviation Investigation Final Report

Location:	Driggs, Idaho	**Accident Number:**	SEA03FA179
Date & Time:	August 25, 2003, 13:30 Local	**Registration:**	N7924V
Aircraft:	Aero Commander Callair A-9B	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

During takeoff with a glider in tow, while passing through an altitude of 200 feet above the ground (agl), the aircraft's engine experienced a catastrophic failure. The pilot then released the glider and executed a forced landing on nearby terrain. Although the touchdown was successful, the aircraft hit a fence before the pilot could bring it to a stop. A teardown examination of the engine determined that the circlip holding one of the counterweight roller pin retaining washers had come out of the groove in the counterweight body. This lead to the roller pin coming in contact with the number five and number six connecting rods, and ultimately to the catastrophic failure. A comparison of wear pattern development on the subject circlip with the others on the counterweight body determined that it had come out of its retaining groove soon after the counterweight was overhauled about 21 hours prior to the accident. Wear patterns also indicated that the subject circlip had been installed with its "sharp edge" facing inwards, which is contradictory to the instructions contained in Textron Lycoming Service Instruction 1012F.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: A loss of engine power due to the improper installation of a counterweight roller pin retaining washer circlip, leading to the circlip coming out of its groove and the counterweight roller pin coming in contact with two of the engines connecting rods. Contributing to the accident were the fence and the uneven terrain.

Findings

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

Findings
1. (C) ENG ASSEMBLY,CRANKSHAFT COUNTERWEIGHTS/VIB DAMPER - LOOSE PART/BOLT/NUT/CLAMP/ETC
2. (C) MAINTENANCE,OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL

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

Occurrence #3: ON GROUND/WATER COLLISION WITH OBJECT
Phase of Operation: EMERGENCY LANDING

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

Factual Information

HISTORY OF FLIGHT

On August 25, 2003, approximately 1330 mountain daylight time, an Aero Commander Callair A-9B, N7924V, impacted a fence during the landing roll, after losing power just after takeoff from Reed Memorial Airport, Driggs, Idaho. The airline transport pilot, who was the sole occupant, was not injured, but the aircraft, which is owned and operated by Teton Avjet, sustained substantial damage. The 14 CFR Part 91 glider tow flight was being operated in visual meteorological conditions. No flight plan had been filed.

According to the pilot, who had just departed the airport with a glider in tow, upon reaching 200 feet above the ground, he heard a loud "explosion" followed by smoke coming from the engine compartment. The aircraft then experienced a complete loss of engine power. He therefore released the glider, which made a successful landing, and attempted a forced landing in a nearby field. Although the initial touchdown was uneventful, during the landing roll the aircraft impacted a fence before the pilot was able to bring it to a stop.

In addition to the substantial damage to the airframe, inspection of the engine found the number six connecting rod extending out of the top of the crankcase, and the case itself cracked completely around its circumference. The oil sump was intact, and the dip stick indicated eight of the possible 12 quarts were still present. There was no indication of heat stress due to lack of lubrication.

Upon further engine disassembly, it was determined that the counterweight roller pin was no longer present in the number one counterweight roller pin hole, and the roller pin retaining washer and circlip were missing from the front (propeller flange side) of the subject counterweight hole (see diagram #1). The roller pin, circlip (in two pieces) and about one-third of the pin-retaining washer were found in the engine oil sump. Further inspection revealed two circular gouges, one 20 millimeters in diameter and the other 15 millimeters in diameter, on the outer ridges of the shaft of the number five connecting rod. These gouges were directly in front of where the number five shaft normally rotates past the forward end of the number one counterweight hole (see photos #1 and #2). In addition it was found that the bushing in the forward face of the number one counterweight hole had been forcefully cocked about 30 degree from its normal installation alignment, and there was a one millimeter by three millimeter gouge along the outer lip of the bushing. Immediately adjacent to the gouge on the bushing, there was a circular shaped gouge/compression in the body of the counterweight itself. The center of this gouge, which measured eight millimeters by twelve millimeters, contained a bluish-black heat signature (see photo #3).

There was contact damage on the shaft of the number six connecting rod, which was bent

about 30 degrees about mid-shaft. Both of its rod cap bolts had fractured, and the rod cap had come off. Both cap bolts had necked down to the point of the fracture, and the fracture surfaces were dull gray and fibrous, with numerous jagged 45 degree edges.

As part of the inspection, all of the remaining counterweight roller pins, retaining washers, and circlips were removed from the counterweights, and the counterweights were removed from their mounting tangs/blades. Inspection of the removed circlips established that all of them had clear and distinct wear patterns on their inward facing (toward the washer) and outward facing surfaces. On their inward face the circlips displayed a well-developed shinny wear pattern over most of their surface, except along the inner and outer edges (see photo #4). The well-developed shinny wear pattern on their outward face (see photos #5 and #6) was present only along the outermost edge, and was less than one millimeter wide. All of the removed circlips, except the number two aft circlip, were found to be installed with the "sharp edge" outward, as is called for in Textron Lycoming Service Instruction No. 1012F. The number two aft circlip was found to be installed with the "sharp edge" facing inward.

Optical examination of the faces of the failed circlip with a binocular microscope determined that no clear or well developed wear pattern was present on either side. The rounded-edge face of the circlip showed a very slight rubbing/buffing pattern along most of its outer edge, coinciding with the location of the well-developed pattern on the outer circumference of the sharp-edge face of all but one of the other circlips. No discernable rubbing, buffing, or wear pattern was detected on the sharp-edge face of the number one circlip.

All of the removed retaining washers, except the aft washer on hole number one, had a very well developed circular wear pattern on their inward facing (toward the roller pin) surfaces (see photos #7 and #8). The number one hole aft washer showed only a very slight unclearly-defined wear pattern (see photo #9).

ADDITIONAL DATA AND INFORMATION

According to the engine log book, the engine was overhauled by the owner/operator of the aircraft, Teton Aviation Center, on August 5, 2003. As part of that process, the crankcase halves, the crankshaft, and the connecting rods were sent to Engine Components, Inc., (ECI) for inspection and overhaul. According to ECI work order 44673, the crankshaft was plated and polished, and both the crankshaft blades and the counterweight bodies were rebushed. The components were then returned to Teton Aviation Center for installation in the overhauled engine. At the time of the accident, the engine had accumulated approximately 21 hours of time in service since the overhaul.

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	58,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land; Multi-engine sea	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Glider	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane multi-engine; Airplane single-engine; Glider; Instrument airplane	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	June 27, 2003
Occupational Pilot:	UNK	**Last Flight Review or Equivalent:**	June 21, 2003
Flight Time:	15000 hours (Total, all aircraft), 2000 hours (Total, this make and model), 14950 hours (Pilot In Command, all aircraft), 116 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Aero Commander	**Registration:**	N7924V
Model/Series:	Callair A-9B	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Restricted (Special)	**Serial Number:**	1563
Landing Gear Type:	Tailwheel	**Seats:**	1
Date/Type of Last Inspection:	August 5, 2003 Annual	**Certified Max Gross Wt.:**	3000 lbs
Time Since Last Inspection:	21 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4587.5 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	IO-540-G1C5
Registered Owner:	Teton Avjet, LTD, LLC	**Rated Power:**	290 Horsepower
Operator:		**Operating Certificate(s) Held:**	None

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:	Clear	**Visibility**	40 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	210°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:		**Temperature/Dew Point:**	27°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Driggs, ID (U59)	**Type of Flight Plan Filed:**	None
Destination:	(U59)	**Type of Clearance:**	None
Departure Time:	13:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Reed Memorial U59	**Runway Surface Type:**	Grass/turf
Airport Elevation:	6230 ft msl	**Runway Surface Condition:**	Rough
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	43.738609,-111.091941

Administrative Information

Investigator In Charge (IIC):	Anderson, Orrin
Additional Participating Persons:	Eric McRae; Salt Lake FSDO
Original Publish Date:	March 30, 2004
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=57807