Aviation Investigation Final Report

Location:	Fairbanks, Alaska	**Accident Number:**	ANC24FA029
Date & Time:	April 23, 2024, 10:03 Local	**Registration:**	N3054V
Aircraft:	Douglas C54D	**Aircraft Damage:**	Destroyed
Defining Event:	Explosion (non-impact)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

The purpose of the flight was to transport fuel and propane tanks in the airplane, which was powered by four radial engines. About three minutes after takeoff, the pilots reported to air traffic control that there was a fire onboard and began a left turn back to the airport. Eyewitnesses who saw the airplane shortly after takeoff reported that the outboard left (No. 1) engine was not running, and that the engine was trailing a small, white plume of smoke, followed shortly thereafter by visible flames. Surveillance video captured the white smoke and flames emanating from the No. 1 engine. Seconds after flames appeared, a bright white explosion could be seen from aft of the No. 1 engine. The airplane then entered an uncontrolled, descending left turn into terrain.

Review of the airplane's maintenance records revealed the No.1 engine was replaced with an overhauled engine one week before the accident. According to the director of operations, the outboard left fuel tank, located near the No. 1 engine, was reported in the days before the accident to leak when full. The fuel leaked into a space behind the No.1 engine and dripped out of the wing behind the engine. Although a repair had been made, this repair did not fix the leak. For several days before the accident, the airplane was parked with full fuel tanks, dripping fuel into the wing space behind the No. 1 engine.

The examination of the No.1 engine and portions of the recovered airframe revealed an AN-8 hose resting in the exhaust heat shield area. The hose had burned from the fitting and the threads were in good condition with no apparent mechanical damage. A portion of the firewall, which was separated from the engine, engine mount, and remaining portion of the airframe, had a 90° elbow -8 sized AN bulkhead fitting installed. One end of the fitting had a B-nut and metal hard line installed. The opposing end did not have a B-nut or hose attached. The threads of the fittings were intact and undamaged. The fitting was part of the propeller feathering

system. Oil residue was observed throughout the entire external area of the exhaust system. The outer structure exhibited a light residue of oil on the external side.

Based on the witness statements of the No. 1 engine not running and trailing smoke, it is likely that the No. 1 engine lost power shortly after takeoff; however, due to the extensive thermal and impact damage to the engine, the reason for the loss of power could not be determined based on the available information. Following the loss of engine power, the pilots would have attempted to feather the propeller. It is likely that, when the feathering pump system was activated, the incorrectly installed B-nut near the engine firewall would have produced a spray of high-pressure oil around the hot exhaust system. This would be consistent with the initial white smoke and fire seen in the video, and the oil residue found in the area of the exhaust system. The fuel that had leaked from the outboard left fuel tank into a compartment behind the No. 1 engine subsequently ignited, resulting in the explosion that separated the airplane's aileron bell housing and resulted in the pilots' inability to control the airplane and subsequent impact with terrain.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A loss of power of the No. 1 engine for reasons that could not be determined, and the incorrect installation of a B-nut fitting in the propeller feathering system, which allowed engine oil to spray onto the exhaust system when the propeller was feathered following the loss of engine power. Contributing to the accident was an incorrectly repaired fuel leak, which resulted in an explosion that separated the aileron bell housing that resulted in a loss of control and subsequent impact with terrain.

Findings

Personnel issues	Installation - Maintenance personnel
Aircraft	Fuel - Incorrect service/maintenance
Aircraft	Fuel storage - Damaged/degraded
Aircraft	Ailerons - Damaged/degraded
Aircraft	(general) - Unknown/Not determined

Factual Information

History of Flight

Enroute-climb to cruise	Unknown or undetermined
Enroute-climb to cruise	Fire/smoke (non-impact)
Enroute-climb to cruise	Explosion (non-impact) (Defining event)
Enroute-climb to cruise	Part(s) separation from AC
Enroute-climb to cruise	Loss of control in flight
Uncontrolled descent	Part(s) separation from AC

On April 23, 2024, about 1003 Alaska daylight time, a Douglas C54D-DC airplane, N3054V, was destroyed when it was involved in an accident near Fairbanks, Alaska. The two pilots were fatally injured. The airplane was operated by Alaska Air Fuel Corporation as a Title 14 *Code of Federal Regulations* Part 91 flight.

The purpose of the flight was to transport 3,400 gallons of unleaded fuel and two 100-gallon propane tanks from Fairbanks International Airport (FAI), to Kobuk Airport (OBU), Kobuk, Alaska. The airplane departed about 0955. An eyewitness reported seeing the airplane flying to the west and stated that the far left engine was not running. They also noticed a small, white plume of smoke coming from that engine. The airplane started to turn to the south, and at that point he noticed that the engine was on fire.

About three minutes after departure, the pilot reported to air traffic control that there was a fire onboard and began a left turn back to the airport. Video surveillance showed white smoke begin to develop behind the No. 1 engine, followed by flames. Seconds later, a bright white explosion could be seen just behind the No. 1 engine. The airplane then entered an uncontrolled, descending left turn into terrain. The No. 1 engine separated from the wing about 100 ft above the ground and landed on a frozen river. About two minutes later, the video showed a large explosion. The University of Alaska Fairbanks (UAF) detected multiple low-frequency sound (infrasound) signals associated with the accident. Based on the data collected by UAF, the first explosion was at 1001, the airplane impacted terrain at 1003, and the second explosion was at 1006.

An extensive postcrash fire ensued, which destroyed much of the airplane's structure. The airplane was equipped with Spidertracks, which enabled real-time flight tracking, automated flight watch, two-way communication, and flight data monitoring. Review of the Spidertracks data revealed that the airplane powered up at 0925 and departed at 0955. At 0958, the

airplane's airspeed began to decrease from 135 knots (kts) to 117 kts. The airspeed stabilized at 0959, and at 1000, the airspeed began to increase to 148 kts.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	68,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	October 1, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	June 19, 2023
Flight Time:	35547 hours (Total, all aircraft), 20980 hours (Pilot In Command, all aircraft)		

Co-pilot Information

Certificate:	Commercial	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Unknown
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 2 Without waivers/limitations	**Last FAA Medical Exam:**	September 2, 2023
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	March 29, 2024
Flight Time:	10769 hours (Total, all aircraft), 4061 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Douglas	**Registration:**	N3054V
Model/Series:	C54D	**Aircraft Category:**	Airplane
Year of Manufacture:	1945	**Amateur Built:**	
Airworthiness Certificate:	Transport; Restricted (Special)	**Serial Number:**	10547
Landing Gear Type:	Retractable - Tricycle	**Seats:**	3
Date/Type of Last Inspection:	April 19, 2024 100 hour	**Certified Max Gross Wt.:**	72000 lbs
Time Since Last Inspection:	6.7 Hrs	**Engines:**	4 Reciprocating
Airframe Total Time:	24726.6 Hrs at time of accident	**Engine Manufacturer:**	Pratt & Whitney
ELT:	C126 installed, not activated	**Engine Model/Series:**	R-2000-7M2
Registered Owner:	ALASKA AIR FUEL INC	**Rated Power:**	1450 Horsepower
Operator:	ALASKA AIR FUEL INC	**Operating Certificate(s) Held:**	None

The No. 1 engine was replaced with a serviceable engine about two weeks before the accident and again with an overhauled engine one week before the accident. The No. 1 engine was overhauled by Anderson Aeromotive Inc and was completed in November 2023.

According to the operator's director of operations, several days before the accident, there was a fuel leak in the outboard fuel tank on the left wing, near the No. 1 engine. A repair had been made the day before the flight to Fairbanks, but the repair did not fix the leak. The tank only leaked when it was full and leaked at a rate of about 5 to 10 drops of fuel per minute. The fuel would leak into a space behind the No.1 engine and dripped out of the wing behind that engine. The airplane sat for several days with full fuel tanks before the accident flight, dripping fuel into the wing space behind the No.1 engine.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	AFA,430 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	10:53 Local	**Direction from Accident Site:**	56°
Lowest Cloud Condition:	Few / 11000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:		**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.92 inches Hg	**Temperature/Dew Point:**	7°C / -2°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Fairbanks , AK (FAI)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Kobuk, AK (OBU)	**Type of Clearance:**	VFR
Departure Time:	09:55 Local	**Type of Airspace:**	Air traffic control;Class D

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	In-flight
Ground Injuries:		**Aircraft Explosion:**	In-flight
Total Injuries:	2 Fatal	**Latitude, Longitude:**	64.745345,-148.07959

An aerial search of the area near the location of the in-flight explosion revealed two large sections of the upper left wing, the aileron bell housing, and numerous small aluminum fragments. The debris was found in a generally straight line within about 150 yards. The upper outside skin of the metal fragment revealed evidence of melted metal.

The recovered No.1 engine and portions of the recovered airframe were retained for further examination. The accessory and blower section had separated from the engine case. The propeller remained attached to the gear reduction assembly, which was separated from the engine case. The engine mount remained attached, with some impact and thermal damage. The carburetor was separated from the accessory case. The fuel pump, propeller governor, and both magnetos were separated from the engine and not recovered.

The engine case, which consisted of two rows of cylinders, was mostly intact and displayed varying degrees of impact damage. Several pushrods were separated and not located. Two

cylinders were removed, one from each row, and the engine's internal area was inspected with a lighted borescope. The engine crankshaft, master rods, articulating rods, and pistons were intact and exhibited normal operating signatures. The bottom of the piston skirts had weight markings (from a marker), consistent with when the engine would have been overhauled. The rear cam ring was exposed due to the accessory case being separated from the engine case. The cam ring and cam followers were all in good condition and showed no wear. The crankcase section of the engine did not reveal any evidence of pre-impact damage.

The propeller reduction gearcase and the nose of the engine case had separated, exposing the internal planetary gears. The gears appeared in excellent condition, still bearing the markings (in marker) for timing. The nose case and gears showed no evidence of any pre-impact damage.

The accessory case and blower section exhibited varying degrees of impact damage. This section of the engine exhibited varying degrees of fire and thermal damage. Multiple heater pads were damaged or consumed by fire. The area to the upper right of the carburetor mount exhibited extensive thermal damage. Numerous hoses and wiring were consumed by fire.

The carburetor, which was separated from its mount, was covered with soot. The intake screen exhibited thermal damage. The fuel hoses were mostly burned away; however, the hose B-nuts remained attached to their respective fittings. The throttle and mixture control arms remained attached to the carburetor; however, the linkages were separated.

A blower vent fitting on the bottom of the engine was separated from the engine; the safety wire remained attached and secure to the engine. The threads of the vent fitting were undamaged and appeared to be corroded.

One AN-8 hose fitting was found in the exhaust heat shield area. The hose had burned from the fitting and the threads were in good condition with no apparent mechanical damage. A portion of the firewall, which was separated from the engine, engine mount, and remaining portion of the airframe, had a 90° elbow -8 sized AN bulkhead fitting installed. One end of the fitting had a B-nut and metal hard line installed. The opposing end did not have a B-nut or hose attached. The threads of the fittings were intact and undamaged. The fitting was part of the propeller feathering system.

The exhaust system was impact damaged. Oil residue was observed throughout the entire external area of the exhaust system. The propeller remained attached to the propeller flange and gearcase. One blade was separated at the hub and was not recovered. The two remaining propeller blades remained attached to the propeller hub and were relatively undamaged. The propeller blades were between the unfeathered and feathered position. A portion of wing leading edge structure was part of the recovered wreckage, and exhibited a light residue of oil on the external side.

The propeller feathering system lines transfer engine oil from the nacelle tank to the propeller-feathering pump, mounted on the aft side of the firewall, and from the pump, through the

firewall, forward to the governor fitting. The nacelle oil tank provides oil to be used by the engine for normal lubrication; the oil is taken from the tank through a standpipe. If all the oil available for engine lubrication is used (down to the top of the standpipe), a reserve supply of 1.8 gallons, which is sufficient for propeller feathering, is still left in the tank. High-pressure oil from the feathering system flows through the governor, automatically disconnecting the governor when the feathering system is in operation.

Administrative Information

Investigator In Charge (IIC):	Ward, Mark
Additional Participating Persons:	Alan Cruce; Alaska Air Fuel INC ; Wasilla, AK Dustin Hopkins; FAA; Fairbanks, AK
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Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=194141