



# National Transportation Safety Board Aviation Incident Final Report

---

<b>Location:</b>	TANANA, AK	<b>Incident Number:</b>	ANC001A063
<b>Date &amp; Time:</b>	06/01/2000, 1330 AKD	<b>Registration:</b>	N3536B
<b>Aircraft:</b>	Piper PA-31-350	<b>Aircraft Damage:</b>	Minor
<b>Defining Event:</b>		<b>Injuries:</b>	5 None
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Scheduled		

---

## Analysis

A passenger aboard a twin-engine, scheduled commuter airplane reported to the pilot that there was black smoke, fire, and oil coming from the left engine. The pilot shut down the left engine, made a 180-degree turn to return the departure airport, and alerted emergency fire crews to standby for his return. On arrival, fire department personnel extinguished the fire. The airplane was equipped with two TEXTRON Lycoming TIO-540-J2BD engines. A postincident inspection revealed the oil filter adapter plate gasket material displayed obvious signs of degradation and deformation. A subsequent investigation revealed that the manufacturer that supplied TEXTRON Lycoming with the oil filter adapter plate gaskets, recently changed material suppliers. The new gasket material did not meet the existing specifications, and deteriorated when in contact with hot engine oil. A subsequent oil leak sprayed engine oil within the engine cowling, near the rear of the engine, adjacent to the engine turbocharger.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: An in-flight oil leak due to the deterioration of oil filter adapter plate gasket material, and the supplier's distribution of inadequate material. A factor associated with the accident was the engine manufacturer's inadequate quality control.

## Findings

---

Occurrence #1: FIRE  
Phase of Operation: CRUISE

### Findings

1. (C) LUBRICATING SYSTEM,OIL GASKET - DETERIORATED
2. (C) MATERIAL INADEQUATE - SUPPLIER/DISTRIBUTOR OF PARTS
3. (F) INADEQUATE QUALITY CONTROL - MANUFACTURER

## Factual Information

On June 1, 2000, about 1330 Alaska daylight time, a wheel equipped Piper PA-31-350 airplane, N3536B, sustained minor damage as a result of an in-flight engine fire, about 20 miles east of Tanana, Alaska. The airplane was being operated as a visual flight rules (VFR) scheduled passenger flight under Title 14, CFR Part 135, when the incident occurred. The airplane was operated by Frontier Flying Service, Fairbanks, Alaska, as Flight 5811 to Fairbanks. The certificated airline transport pilot, and the four passengers aboard, were not injured. Visual meteorological conditions prevailed, and VFR company flight following procedures were in effect. The flight originated at the Tanana Airport, about 1300.

During a telephone conversation with the National Transportation Safety Board investigator-in-charge on June 1, the assistant director of operations reported that while in cruise flight a passenger seated in the rear passenger compartment reported to the pilot that there was black smoke and oil coming from the left engine. He said the pilot shut down the left engine, made a 180-degree turn to return to Tanana, and alerted emergency fire crews to standby for his return. He said that upon arrival in Tanana, fire department personnel extinguished the remaining fire.

The airplane sustained minor damage to the left flap, left main landing gear door, and left engine nacelle.

The airplane was equipped with two Textron Lycoming TIO-540-J2BD engines.

A Federal Aviation Administration (FAA) airworthiness inspector from the Fairbanks Flight Standards District Office, traveled to the Tanana Airport on June 3, and examined the incident airplane. The inspector reported that the aft portion of left engine nacelle was charred, blackened, and melted in the area adjacent to the rear of the engine assembly. Once the engine cowlings were removed, he discovered that there was a substantial amount of oily, black residue covering the interior of the engine cowlings. He said that the heaviest concentration of oily residue surrounded the rear of the engine assembly, adjacent to the engine turbocharger, engine oil filters, and various engine accessories.

The FAA inspector related that in the course of preparing the airplane for a ferry flight back to Fairbanks, all fire-damaged parts were removed and replaced with serviceable parts. He added that during the postmaintenance engine run-up, maintenance personnel observed a fine mist of engine oil coming from the base of the screw-on engine oil filter. He stated that the oil was spraying directly onto the engine turbocharger unit. The engine run-up was discontinued.

The screw-on engine oil filter was removed, which exposed the oil filter converter plate assembly.

The FAA inspector reported that a closer inspection of the oil filter adapter plate gasket material revealed obvious signs of degradation and deformation. The gasket material appeared rubbery to the touch, and a portion of the gasket material was deformed around the outer edge of the converter plate. He added that a portion of the gasket material was missing from the mating surfaces of the seal.

## ENGINE INFORMATION

The airplane is maintained on an Approved Airworthiness Inspection Program (AAIP). The most recent inspection was accomplished on May 31, 2000, 7.3 hours before the incident.

A review of historical engine maintenance records revealed that at the time of the incident, the engine had accumulated 734.9 since overhaul, and a total time in service of 4,077.8 hours.

The maintenance records note that TEXTRON Lycoming in Williamsport, Pennsylvania, accomplished a major overhaul on July 29, 1999, 734.9 hours before the incident. A TEXTRON Lycoming representative reported that when an engine undergoes a factory overhaul, the oil filter adapter plate gasket is replaced with a new gasket.

According to the operator's engine maintenance records, on August 24, 1999, the overhauled engine was then installed on N200AK, another company Piper PA-31-350. The incident engine operated in N200AK until December 23, 1999, accumulating 367.2 hours while installed, and 3,710.1 total hours in service. The engine maintenance records note the reason for removal as: "...metal in screen and filter." The engine was returned to TEXTRON Lycoming's Williamsport facility for repairs.

According to TEXTRON Lycoming's log book entries the engine was repaired and returned to service on January 26, 2000. A representative for TEXTRON Lycoming reported that during the reassembly process, following the repairs, a new engine oil filter adapter plate gasket would be installed.

On February 12, 2000, the engine was installed on N3536B, and operated until the incident occurred.

#### TEST AND RESEARCH

The oil filter adapter plate and gasket was removed from the incident engine, and sent to the National Transportation Safety Board's Materials Laboratory for examination and analysis. The NTSB materials engineer assigned to the case reported that the gasket material was deformed toward the interior of the converter plate. In addition, the gasket material had also deformed around the outer edge of the converter plate.

The NTSB materials engineer, in conjunction with a materials engineer from TEXTRON Lycoming, conducted a series of tests on new converter plate gaskets. A new converter plate gasket was subjected to Aeroshell 15W50 engine oil that was heated to 245 degrees F. After about 290 hours, the gasket material displayed signs of deterioration similar to that of the incident gasket.

Procurement personnel from TEXTRON Lycoming contacted the manufacturer of the converter plate gaskets. A subsequent investigation revealed that the manufacturer had recently changed suppliers, which resulted in variance from the required specifications of TEXTRON Lycoming.

#### ADDITIONAL DATA

On July 24, 2000, TEXTRON Lycoming issued a mandatory service bulletin (MSB) No. 543 which requires a visual inspection for evidence of oil leakage from behind the filter base, or evidence of the extrusion of the rubber seal. This inspection is to be complied with before further flight, and at each 50-hour oil change thereafter.

On August 30, 2000, TEXTRON Lycoming issued an updated MSB, No. 543A, which requires the installation of a new gasket, part number LW-13388. In addition, the updated MSB

encompassed all 320, 360, 540, 541, and 720 TEXTRON Lycoming engines.

On September 5, 2000, the Federal Aviation Administration's Burlington, Massachusetts Certification Office, issued an emergency airworthiness directive (AD) requiring: "All TEXTRON Lycoming 320, 360, 540, 541, and 720 series engines will be inspected in accordance with the TEXTRON Lycoming's mandatory service bulletin (MSB) 543A, dated August 30, 2000, and TEXTRON Lycoming's Service Instruction 1453, dated May 9, 1991, before further flight." In addition, the MSB requires the replacement of the oil filter converter plate gasket every 50 hours thereafter.

#### WRECKAGE RELEASE

The Safety Board released the converter plate and gasket to the operator's president on October 30, 2000. The Safety Board retained no other engine components.

#### Pilot Information

<b>Certificate:</b>	Airline Transport	<b>Age:</b>	29, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane Multi-engine	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	03/27/2000
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	4200 hours (Total, all aircraft), 250 hours (Total, this make and model), 4100 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Piper	<b>Registration:</b>	N3536B
<b>Model/Series:</b>	PA-31-350 PA-31-350	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	75952205
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	10
<b>Date/Type of Last Inspection:</b>	05/31/2000, AAIP	<b>Certified Max Gross Wt.:</b>	7368 lbs
<b>Time Since Last Inspection:</b>	7 Hours	<b>Engines:</b>	2 Reciprocating
<b>Airframe Total Time:</b>	19019 Hours	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	TIO-540-J2BD
<b>Registered Owner:</b>	FRONTIER FLYING SERVICE, INC	<b>Rated Power:</b>	350 hp
<b>Operator:</b>	FRONTIER FLYING SERVICE, INC	<b>Operating Certificate(s) Held:</b>	Commuter Air Carrier (135); On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	FFSA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual Conditions	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	, 0 ft msl	<b>Distance from Accident Site:</b>	0 Nautical Miles
<b>Observation Time:</b>	0000	<b>Direction from Accident Site:</b>	0°
<b>Lowest Cloud Condition:</b>	Unknown / 0 ft agl	<b>Visibility</b>	10 Miles
<b>Lowest Ceiling:</b>	Broken / 7000 ft agl	<b>Visibility (RVR):</b>	0 ft
<b>Wind Speed/Gusts:</b>	/	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>		<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>		<b>Temperature/Dew Point:</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	TANANA, AK (TAL)	<b>Type of Flight Plan Filed:</b>	Company VFR
<b>Destination:</b>	FAIRBANKS, AK (FAI)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	1300 ADT	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Minor
<b>Passenger Injuries:</b>	4 None	<b>Aircraft Fire:</b>	In-Flight
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	5 None	<b>Latitude, Longitude:</b>	

## Administrative Information

**Investigator In Charge (IIC):** CLINTON O JOHNSON **Report Date:** 07/10/2001

**Additional Participating Persons:** CALEB A GLICK (FAA); FAIRBANKS, AK

**Publish Date:**

**Investigation Docket:** NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at [pubinq@ntsb.gov](mailto:pubinq@ntsb.gov), or at 800-877-6799. Dockets released after this date are available at <http://dms.nts.gov/pubdms/>.

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).