



National Transportation Safety Board Aviation Accident Final Report

Location:	Boise, ID	Accident Number:	SEA02FA023
Date & Time:	01/02/2002, 1045 MST	Registration:	N132Z
Aircraft:	Beech 58P	Aircraft Damage:	Substantial
Defining Event:		Injuries:	2 None
Flight Conducted Under:	Part 91: General Aviation - Flight Test		

Analysis

Shortly after takeoff for an after maintenance test flight, the pilot noted a fire in the left engine. The pilot reduced power and landed the aircraft on the remaining runway without further incident. The engine and systems were shut down prior to the pilot and passenger evacuating the aircraft. Fire personnel responded and applied a small amount of foam on the engine, which was at the time, only smoking. Inspection of the engine revealed that the fire was contained to the accessory section of the engine. Heat distress was found to the outboard nacelle web assembly and the top wing skin under the nacelle was warped. Further inspection found that an electrical arc in the alternator wiring due to chafing against a pneumatic tube was responsible for the ignition of the fire. Accumulated fuel vapor from a fuel cell leak that was an on-going maintenance discrepancy for approximately three weeks preceding the accident, and eventually fixed, was most probable the source of the fuel.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Improper clearance between an alternator wire and a pneumatic line and fuel fumes. The alternator wire chafe and arcing were factors.

Findings

Occurrence #1: FIRE
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. (F) ELECTRICAL SYSTEM,ELECTRIC WIRING - CHAFED
2. (F) ELECTRICAL SYSTEM,ELECTRIC WIRING - ARCING
3. (C) MISCELLANEOUS,BOLT/NUT/FASTENER/CLAMP/SPRING - CLEARANCE
4. (C) FLUID,FUEL - FUMES

Factual Information

HISTORY OF FLIGHT

On January 2, 2002, at 1045 mountain standard time, a Beech 58P, N132Z, registered to and operated by U.S. Department of Agriculture, as a 14 CFR Part 91 maintenance test flight, experienced an in-flight fire in the left engine shortly after takeoff from Boise Air Terminal (Gowen Field), Boise, Idaho. Visual meteorological conditions prevailed at the time and no flight plan was filed for the local flight. The aircraft was substantially damaged and neither the airline transport pilot nor the mechanic passenger were injured.

The pilot reported that the aircraft had just come out of heavy maintenance and he and the mechanic were taking the aircraft for a test flight. The start, taxi and takeoff were normal. The pilot reported that after the aircraft lifted off and attained an altitude of about 20 feet above ground level, he noticed a fire in the left engine. The pilot immediately reduced power and landed the aircraft on the runway. After landing and coming to a stop on the runway, the pilot shut off the aircraft systems and he and the mechanic evacuated the aircraft with the engine still on fire and smoke coming into the cockpit. Airport fire personnel arrived shortly thereafter and applied a small amount of foam on the engine, which was now only smoking.

DAMAGE TO AIRCRAFT

A Federal Aviation Administration Inspector from the Boise Flight Standards District Office reported that the fire damage was contained to the accessory section aft of the firewall. Inspection by maintenance personnel reported that the fire heat distressed the outboard nacelle web assembly which discolored the primer paint on both sides. The paint had turned black inside the compartment and was brown on the side outside the compartment. Maintenance personnel reported that doublers on both sides of the web assembly were required for reinforcing the structure. It was also noted that the top wing skin under the nacelle was warped. The primer paint was discolored black and the paint was bubbled. An approximate 12 inch by 12 inch patch bonded and riveted to the area was required for the repair.

PERSONNEL INFORMATION

The pilot holds certificates for commercial operations, airline transport pilot and flight instructor. The pilot is rated in single-engine land and sea, and multi-engine aircraft with instrument privileges. At the time, the pilot held a class 1 medical certificate with no waivers or limitations. The pilot reported a total flight time of 6,701 hours in all aircraft and 2,100 hours in the Beech 58P. A total of 180 hours was as pilot-in-command. The pilot successfully accomplished a flight review in a Cessna Citation on October 15, 2001.

AIRCRAFT INFORMATION

A review of the maintenance records revealed that the left wing fuel cell was removed to repair the "T" plate on November 7, 2001. A new cell was ordered as the old cell was old and stiff. On December 6, 2001, a new cell was installed. On December 12, 2001, the fuel cell was filled with fuel. A slow leak was detected from the inboard end of the front spar and appeared to be running along the lower forward face spar in the channel formed by the lower spar cap angle, and front spar face. Four gallons of fuel were removed from the cell and the leak stopped. From December 13 to December 20, maintenance personnel continued to troubleshoot the

problem as the cell continued to leak. On December 21, 2001, the fuel cell was defueled and maintenance personnel found that a lap seam on the upper outboard corner was leaking which was determined to be a manufacturing defect. A new cell was ordered and installed in the aircraft on December 26, 2001. The cell was fueled and no leaks were noted. The aircraft set for 36 hours fully fueled with the access covers removed to observe for leaks. On December 28, 2001, the access hole covers were installed as no leaks were detected. The accident test flight was conducted on January 2, 2002.

TESTS AND RESEARCH

A National Transportation Safety Board Fire and Explosion Specialist inspected the aircraft's fire damaged structure and components. During the inspection, the specialist noted a burned area on the wing skin about 12 inches aft from the leading edge of the wing. The primer paint was discolored and the paint was bubbled. The skin surface was wavy in appearance. The air conditioning system and alternator wire were located in the accessory compartment above this location. The cowling was removed and damage to the nacelle outboard web and other wing support structure was noted in the area of the air-conditioning blower and condensers. A section of the primer paint on the outboard web was discolored on both sides. The air conditioning system was severely fire damaged, sooted and the plastic casing was melted. One of the coolant lines had fractured during the fire. The system contained approximately 13-15 ounces of lubricating oil. The specialist reported that this oil would have been under pressure and would have misted upon release. In the mist form, the oil would have been easily ignited even though its flashpoint is 392 degrees F. The specialist reported that the small amount of oil would have produced a blowtorch effect, which could explain the intense localized damage to the fins of the condenser. The aluminum fins on the condenser was sooted and melted. Towards the trailing edge of the wing, the alternator wire and a pneumatic line was located. The specialist reported, "In the middle of the section of wire, an area of insulation was missing. The surrounding intact insulation was charred and melted. The exposed conductor had areas where the tin coating was missing and the copper wire underneath was visible. There was an eroded pit in the conductor that was visible without magnification. Upon magnification, it was noted that several strands of the conductor had lost material and had a decrease diameter. The pneumatic tube was found in contact with the alternator wire. In the area where the tube had touched the wire, the tube exhibited signs of melting and missing material to the point that the tube had been melted through." The specialist also reported that accumulated fuel vapor from the fuel cell leak was most probable source of fuel.

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Commercial	Age:	36, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land; Single-engine Sea	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine; Instrument Airplane	Toxicology Performed:	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	12/04/2001
Occupational Pilot:		Last Flight Review or Equivalent:	10/15/2001
Flight Time:	6701 hours (Total, all aircraft), 2100 hours (Total, this make and model), 3763 hours (Pilot In Command, all aircraft), 24 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	Registration:	N132Z
Model/Series:	58P	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	TJ-284
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	06/14/2001, Continuous Airworthiness	Certified Max Gross Wt.:	6240 lbs
Time Since Last Inspection:	11 Hours	Engines:	2 Reciprocating
Airframe Total Time:	6083 Hours at time of accident	Engine Manufacturer:	Continental
ELT:	Installed, not activated	Engine Model/Series:	TSIO-520-WB3F
Registered Owner:	US Department of Agriculture	Rated Power:	325 hp
Operator:	US Department of Agriculture	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:		Distance from Accident Site:	
Observation Time:		Direction from Accident Site:	
Lowest Cloud Condition:		Visibility	10 Miles
Lowest Ceiling:	Overcast / 5000 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	/	Turbulence Type Forecast/Actual:	/
Wind Direction:	150°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30.13 inches Hg	Temperature/Dew Point:	2° C / -2° C
Precipitation and Obscuration:			
Departure Point:	Boise, ID (BOI)	Type of Flight Plan Filed:	None
Destination:		Type of Clearance:	None
Departure Time:	1045 MST	Type of Airspace:	Class C

Airport Information

Airport:	Boise Air Terminal (Gowen Fld) (BOI)	Runway Surface Type:	Asphalt
Airport Elevation:	2868 ft	Runway Surface Condition:	Dry
Runway Used:	10R	IFR Approach:	None
Runway Length/Width:	9763 ft / 150 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	Debra J Eckrote	Report Date:	11/04/2002
Additional Participating Persons:	Michael Misnick; FAA-FSDO; Boise, ID		
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 , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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