Aviation Investigation Final Report

Location:	PORTLAND, Oregon	**Accident Number:**	SEA99FA060
Date & Time:	May 8, 1999, 14:50 Local	**Registration:**	N6222V
Aircraft:	Beech 36	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

During the takeoff roll, the pilot heard a loud explosion and the aircraft violently yawed to the left. The aircraft veered off the runway and came to rest in a grassy area between the runway and the taxiway. Examination of the aircraft's fuel system revealed evidence of a preexisting fuel leak. Blue streaking and staining, consistent in color with 100 low lead aviation fuel, was noted on the ventral surfaces of the aircraft. Examination of the aircraft's fuel bladder revealed that the plastic interconnect nipple for the vent line, and the plastic interconnect nipple for the fuel return line, located at the distal end of the aircraft's fuel bladder, were fractured. Further examination of the fuel bladder revealed approximately 20 preexisting holes in the bladder's fabric. The aircraft's maintenance logbook indicated that the aircraft was equipped with a strobe light kit. Examination of the strobe light system revealed that the installation of the strobe kit was not in accordance with the manufacture's installation instructions. Instead, the wiring harness for the strobe light was routed parallel to a stringer, between the wing ribs and the skin of the aircraft. Examination of the wiring revealed that the wire's insulation was chafed, cut and discolored. The discoloration of the wiring was indicative of arcing.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: Improper installation of the strobe light system. Factors include a leak in the fuel bladder and electrical arcing.

Findings

Occurrence #1: EXPLOSION
Phase of Operation: TAKEOFF - ROLL/RUN

Findings
1. ELECTRICAL SYSTEM,ELECTRIC WIRING - CHAFED
2. MAINTENANCE,INSTALLATION - IMPROPER - OTHER MAINTENANCE PERSONNEL
3. ELECTRICAL SYSTEM,ELECTRIC WIRING - ARCING
4. FUEL SYSTEM,TANK - ARCING

Factual Information

HISTORY OF FLIGHT

On May 8, 1999, about 1450 Pacific daylight time, a Beechcraft 36, N6222V, registered to and operated by the airline transport pilot (ATP), was substantially damaged subsequent to an explosion in the aircraft's left wing. The aircraft was on its takeoff roll at Portland International Airport, Portland, Oregon. The pilot aborted the takeoff roll without further incident. Visual meteorological conditions prevailed and no flight plan was filed for the 14CFR91 local personal/pleasure flight. The pilot and his passenger were not injured and there was no report of a fire or ELT activation.

The aircraft's strobe lights were activated by the pilot at the start of the take-off roll. The navigation lights and pitot heat were off. The pilot stated that during the takeoff roll, approximately 80 miles per hour, he heard a loud bang and the aircraft violently yawed to the left (south). The aircraft veered off the runway and came to rest in a grassy area between runway 28R and the taxiway.

TESTS AND RESEARCH

Examination of the aircraft revealed extensive damage to the outboard section of the aircraft's left wing, from the outboard edge of the fuel bladder (mid span) to the wingtip. The fuel bladder was not breached and contained approximately 40 gallons of 100 low lead.

Examination of the aircraft's fuel system revealed evidence of a preexisting fuel leak. Blue streaking and staining, consistent in color with 100 low lead, was noted on the ventral surfaces of the aircraft. The discoloration extended from the wing root outward to approximately wing station 108, and rearward from the lower spar cap to the trailing edge of the wing (Refer to Photograph 2). The discoloration and staining were observed on both wings.

Examination of the aircraft's fuel bladder revealed that the plastic interconnect nipple for the vent line, and the plastic interconnect nipple for the fuel return line, located at the distal end of the aircraft's fuel bladder, were fractured. The fuel bladder and its associated parts were shipped to the National Transportation Safety Board Materials Laboratory, Washington D.C. for further examination. The specialist reported that the fracture surfaces on both interconnect nipples (vent and return) were characteristic of fatigue type cracking (Refer to Report 99-148). A pressure test of the fuel bladder also revealed that there were approximately 20 additional preexisting holes in the bladder.

The aircraft's maintenance logbook indicated that the aircraft was equipped with a strobe light kit (part number 35-3017-5p), installed on November 15, 1984. Examination of the strobe light

system revealed that the installation of the strobe kit was not in accordance with the manufacture's installation instructions (Attachment #1). Instead, the wiring harness for the strobe light was routed parallel to a stringer between the wing ribs and the skin of the aircraft. Examination of the wiring revealed that the wire's insulation was chafed and discolored (Refer to Photograph #3). Two cuts in the wire's insulation were also observed. The wiring harness was removed and shipped to the National Transportation Safety Board's Materials Lab for further examination. The specialist reported that discoloration, indicative of arcing, was noted to the wiring (Refer to Fire/Explosive Factual Report).

Further examination of the strobe light system revealed that the aircraft was equipped with two power supply units, one mounted in each wing tip. The installation instructions from the manufacturer call for a single power supply unit mounted in the tail of the aircraft at approximately station 170. An inspection of this area revealed no evidence that a single power supply unit was ever installed.

According to the maintenance logbook, the aircraft's last annual inspection was on July 30, 1998, at 797 hours tachometer time. There was no indication that the Beechcraft Service Instruction (Number 0632-280) pertaining to possible fuel seepage from the fuel bladder was performed. The logbook also indicated that the fuel bladder in the left wing was repaired and leak checked on January 14, 1981.

ADDITIONAL DATA

The aircraft and its affected components were released to the owner on November 16, 1999.

Pilot Information

Certificate:	Airline transport; Flight engineer; Flight instructor	**Age:**	42,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	March 1, 1999
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	8000 hours (Total, all aircraft), 300 hours (Total, this make and model), 2000 hours (Pilot In Command, all aircraft), 245 hours (Last 90 days, all aircraft), 85 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Beech	**Registration:**	N6222V
Model/Series:	36 36	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	E-3
Landing Gear Type:	Retractable - Tricycle	**Seats:**	6
Date/Type of Last Inspection:	July 28, 1998 Annual	**Certified Max Gross Wt.:**	3600 lbs
Time Since Last Inspection:	50 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	3500 Hrs	**Engine Manufacturer:**	Continental
ELT:	Installed, not activated	**Engine Model/Series:**	IO-520-BA
Registered Owner:	GREGORY WILSON	**Rated Power:**	285 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	PDX ,30 ft msl	**Distance from Accident Site:**	
Observation Time:	11:56 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Scattered	**Visibility**	10 miles
Lowest Ceiling:	Broken / 5000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	14 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	300°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	9°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	(PDX)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	VFR
Departure Time:	14:50 Local	**Type of Airspace:**	Class C

Airport Information

Airport:	PORTLAND INTERNATIONAL PDX	**Runway Surface Type:**	Asphalt
Airport Elevation:	30 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	28R	**IFR Approach:**	None
Runway Length/Width:	10000 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	On-ground
Total Injuries:	2 None	**Latitude, Longitude:**	45.569934,-122.589134(est)

Administrative Information

Investigator In Charge (IIC):	Hogenson, Dennis
Additional Participating Persons:	CLIFFORD COLVIN; PORTLAND , OR MIKE STOCKHILL; SEATTLE , WA STUART BOTHWELL; WICHITA , KS
Original Publish Date:	June 22, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=46302