



National Transportation Safety Board Aviation Accident Final Report

Location:	RENO, NV	Accident Number:	LAX94LA030
Date & Time:	10/27/1993, 2315 PDT	Registration:	N191FL
Aircraft:	BEECH 200	Aircraft Damage:	Substantial
Defining Event:		Injuries:	5 None

Flight Conducted Under: Part 91: General Aviation - Personal

Analysis

AFTER MOVING THE LANDING GEAR HANDLE TO THE UP POSITION, THE COCKPIT BEGAN FILLING WITH SMOKE. THE PILOT NOTICED THAT THE GEAR APPEARED TO BE HUNG IN AN INTRANSIT POSITION. THE SMOKE, WHICH SMELLED OF BURNING ELECTRICAL INSULATION, BECAME HEAVIER, AND HEAT COULD BE FELT ON THE COCKPIT FLOOR. THE PILOT RETURNED TO THE AIRPORT, AND THE GEAR COLLAPSED DURING LANDING. EXAMINATION REVEALED THAT THE LANDING GEAR MOTOR AND ASSOCIATED WIRING WERE BURNED, AND THE COCKPIT FLOORING APPEARED TO BE PARTIALLY MELTED. THE RIGHT LANDING GEAR ACTUATOR WAS FOUND TO HAVE BEEN IMPROPERLY OVERHAULED, WHICH RESULTED IN THREE GEAR TEETH BREAKING AND JAMMING THE ACTUATOR. BEECH MANDATORY SERVICE BULLETIN NO. 2035, REV. II, REQUIRING REPLACEMENT OF THE 200-AMP GEAR MOTOR CIRCUIT BREAKER WITH A 60-AMP BREAKER TO PREVENT GEAR MOTOR DAMAGE, WAS NOT ACCOMPLISHED ON THIS AIRPLANE.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE IMPROPER OVERHAUL OF THE RIGHT MAIN LANDING GEAR ACTUATOR BY MAINTENANCE PERSONNEL, AND THE OPERATOR'S FAILURE TO ASSURE THAT THE AIRPLANE MANUFACTURER'S MANDATORY SERVICE BULLETIN REQUIRING MODIFICATION OF THE GEAR MOTOR CIRCUIT PROTECTION WAS ACCOMPLISHED.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION

Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

1. (C) LANDING GEAR,NORMAL RETRACTION/EXTENSION ASSEMBLY - FAILURE,PARTIAL
2. (C) MAINTENANCE,OVERHAUL - IMPROPER - OTHER MAINTENANCE PERSONNEL
3. (C) LANDING GEAR,NORMAL RETRACTION/EXTENSION ASSEMBLY - JAMMED

Occurrence #2: FIRE

Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

4. (C) ELECTRICAL SYSTEM,ELECTRIC MOTOR - OVERLOAD
5. (C) MAINTENANCE,SERVICE BULLETIN/LETTER - NOT PERFORMED - COMPANY/OPERATOR MANAGEMENT
6. ELECTRICAL SYSTEM,ELECTRIC MOTOR - FIRE
7. ELECTRICAL SYSTEM,ELECTRIC WIRING - FIRE

Occurrence #3: FORCED LANDING

Phase of Operation: LANDING - FLARE/TOUCHDOWN

Occurrence #4: MAIN GEAR COLLAPSED

Phase of Operation: LANDING - ROLL

Factual Information

On October 27, 1993, at 2315 Pacific daylight time, a Beech 200, N191FL, incurred an electrical fire in the landing gear motor and associated wiring during the takeoff initial climb at Reno, Nevada. The aircraft returned to the Reno Cannon International Airport with the landing gear jammed in a partially retracted configuration and the gear collapsed on touchdown. The aircraft was operated by the pilot and was on a cross country personal flight. Visual meteorological conditions prevailed at the time and no flight plan was filed for the operation. The aircraft incurred substantial damage. The certificated private pilot and his four passengers were not injured. The flight was originating at the time of the mishap as a cross country flight to San Carlos, California.

In a verbal statement, the pilot reported that just after moving the landing gear handle to the up position in the initial climb, the cockpit began to fill with smoke. The pilot said he dumped the cabin in an attempt to clear the smoke. He noticed the landing gear appeared to be hung in an intransit position and he pulled the cockpit circuit breaker. The pilot stated that the smoke, which smelled of burning electrical insulation, appeared to get heavier and heat could be felt on the cockpit floor. The pilot said he requested and received a return to airport landing clearance from the control tower, and, just after touchdown, the right main landing gear collapsed.

An FAA airworthiness inspector from the Reno, Nevada, Flight Standards District Office, examined the aircraft. According to his report, the electrical landing gear motor and the associated wiring were burned and the cockpit flooring appeared to be partially melted from radiant heat exposure. The structural landing gear attach points and other bulkhead components in the fuselage sustained major damage.

The landing gear system electrical components, motor, main gear box, and the right main landing gear actuator were removed from the aircraft for detailed examination. The system electrical components examined consisted of: 1) landing gear motor relay K100, 2) landing gear remote circuit breaker CB100, and 3) landing gear remote circuit breaker relay K101.

The system electrical components were found to function within specifications for the 200 ampere gear motor circuit protection requirement. The test reports are attached to this report.

According to the examination report, disassembly of the landing gear motor revealed evidence of excessive current flow at the motor. Burned windings were found on the rotor. Loose balls of solder were noted on the commutator, which was distorted from heat. The motor brushes were within wear limits, but brittle from heat exposure.

The right main landing gear actuator was sent to the FAA Aircraft Certification Office in Wichita, Kansas, for disassembly and examination by Beech Aircraft. The actuator was found in an intermediate position and the shaft would only rotate one turn before encountering a hard stop. Disassembly revealed that two gear teeth had separated from the screw housing ring gear, with one lodged between the ring gear and the pinion gear. According to the Beech Aircraft report of the examination, the actuator was assembled with insufficient shims in place. The lack of shims resulted in insufficient end play and excessive side loads on the gear teeth, which ultimately caused the gear teeth separation and jamming of the actuator.

Review of the aircraft maintenance records revealed that the landing gear actuators were overhauled in September of 1993 at the last aircraft inspection event. The aircraft had accrued

12 operating hours since the landing gear actuators were reinstalled.

Beech Aircraft Service Bulletin 2035 (Rev II) was issued in 1985 and revised in August of 1990. The Bulletin concerns the replacement of the 200 ampere landing gear motor circuit breaker with a 60 ampere rated breaker to prevent motor damage due to excessive electrical current. Beech Aircraft considers the bulletin mandatory in nature. Examination of the aircraft maintenance records revealed that SB 2035 was not accomplished.

Pilot Information

Certificate:	Private	Age:	29, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	Seatbelt, Shoulder harness
Instrument Rating(s):	None	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 Valid Medical--no waivers/lim.	Last Medical Exam:	02/06/1992
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	1000 hours (Total, all aircraft), 23 hours (Total, this make and model), 60 hours (Last 90 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	BEECH	Registration:	N191FL
Model/Series:	200 200	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	BB-107
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	09/16/1993, AAIP	Certified Max Gross Wt.:	12500 lbs
Time Since Last Inspection:	12 Hours	Engines:	2 Turbo Prop
Airframe Total Time:	6420 Hours	Engine Manufacturer:	P&W
ELT:	Installed, not activated	Engine Model/Series:	PT6A-42
Registered Owner:	PACIFIC COAST LEAS CORP	Rated Power:	850 hp
Operator:	EDWARD A. MUELLER	Air Carrier Operating Certificate:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Night/Dark
Observation Facility, Elevation:	, 0 ft msl	Observation Time:	0000
Distance from Accident Site:	0 Nautical Miles	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear / 0 ft agl	Temperature/Dew Point:	6° C
Lowest Ceiling:	None / 0 ft agl	Visibility	20 Miles
Wind Speed/Gusts, Direction:	3 knots, 250°	Visibility (RVR):	0 ft
Altimeter Setting:		Visibility (RVV):	0 Miles
Precipitation and Obscuration:			
Departure Point:	(RNO)	Type of Flight Plan Filed:	None
Destination:	SAN CARLOS, CA (SQL)	Type of Clearance:	VFR
Departure Time:	2313 PDT	Type of Airspace:	Class D; Class E

Airport Information

Airport:	RENO CANNON INTL (RNO)	Runway Surface Type:	Asphalt
Airport Elevation:	4412 ft	Runway Surface Condition:	Dry
Runway Used:	25	IFR Approach:	None
Runway Length/Width:	6101 ft / 150 ft	VFR Approach/Landing:	Forced Landing; Traffic Pattern

Wreckage and Impact Information

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

Administrative Information

Investigator In Charge (IIC):	JEFF RICH,	Adopted Date:	09/01/1994
Additional Participating Persons:	TERRY VAN NATTA; RENO, NV		
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 pubinquiry@ntsb.gov , or at 800-877-6799. Dockets released after this date are available at http://dms.nts.gov/pubdms/ .		

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