



# National Transportation Safety Board Aviation Accident Final Report

---

<b>Location:</b>	GRAND JUNCTION, CO	<b>Accident Number:</b>	DEN91LA095
<b>Date &amp; Time:</b>	07/01/1991, 1500 MDT	<b>Registration:</b>	N20703
<b>Aircraft:</b>	BELL 412	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	3 None

**Flight Conducted Under:** Part 91: General Aviation - Positioning

---

## Analysis

DURING CRUISE FLIGHT, THE ENGINE TO TRANSMISSION DRIVE SHAFT FORWARD COUPLING OVERHEATED AND FAILED. THE PILOT EXECUTE AN AUTORATATION. DURING THE LANDING FLARE, THE PILOT DID NOT MAINTAIN ADEQUATE ROTOR RPM AND THE HELICOPTER LANDED HARD RESULTING IN SKID COLLAPSE. COMPANY MAINTENANCE PERSONNEL DISPATCHED THE HELICOPTER WITH A KNOWN DRIVE SHAFT COUPLING GREASE LEAK WHICH THEY HAD ATTEMPTED TO STOP BY USING AN UNAPPROVED SILICON SEALANT. THEY HAD REPACKED THE 500 PLUS HOUR COUPLING TWO TIMES PRIOR TO THE ACCIDENT. THE NORMAL REPACK INTERVAL WAS ONCE EVERY 600 HOURS. EXAMINATION OF THE FAILED DRIVE SHAFT DID NOT REVEAL ANY MISALIGNMENT, BUT DID ISOLATE HEAT RELATED FAILURE AREAS OF THE FORWARD COUPLING END.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE PILOT'S FAILURE TO MAINTAIN ADEQUATE MAIN ROTOR RPM PRIOR TO TOUCHDOWN. FACTORS WERE: THE DISCONNECTED ENGINE TO TRANSMISSION DRIVE SHAFT AND THE INADEQUATE INSPECTION BY COMPANY MAINTENANCE PERSONNEL.

## Findings

---

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

Phase of Operation: CRUISE

Findings

1. (F) ROTOR DRIVE SYSTEM,ENGINE TO TRANSMISSION DRIVE - DISCONNECTED
2. (F) MAINTENANCE,INSPECTION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL

-----

Occurrence #2: FORCED LANDING

Phase of Operation: DESCENT - EMERGENCY

Findings

3. AUTOROTATION - PERFORMED - PILOT IN COMMAND

-----

Occurrence #3: HARD LANDING

Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings

4. (C) ROTOR RPM - NOT MAINTAINED - PILOT IN COMMAND

## Factual Information

### Pilot Information

<b>Certificate:</b>	Airline Transport	<b>Age:</b>	42, Male
<b>Airplane Rating(s):</b>	Multi-engine Land	<b>Seat Occupied:</b>	Unknown
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Helicopter	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>		<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	07/24/1989
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	4010 hours (Total, all aircraft), 300 hours (Total, this make and model), 2500 hours (Pilot In Command, all aircraft), 40 hours (Last 90 days, all aircraft), 12 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

### Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	BELL	<b>Registration:</b>	N20703
<b>Model/Series:</b>	412 412	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>		<b>Serial Number:</b>	33017
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	6
<b>Date/Type of Last Inspection:</b>	Unknown	<b>Certified Max Gross Wt.:</b>	11900 lbs
<b>Time Since Last Inspection:</b>	0 Hours	<b>Engines:</b>	2 Turbo Shaft
<b>Airframe Total Time:</b>		<b>Engine Manufacturer:</b>	P&W
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	PT6T-3B
<b>Registered Owner:</b>	AIR METHODS CORPORATION	<b>Rated Power:</b>	1350 hp
<b>Operator:</b>	AIR METHODS CORPORATION	<b>Operating Certificate(s) Held:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	CKLA

## Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	, 0 ft msl	Distance from Accident Site:	0 Nautical Miles
Observation Time:	0000	Direction from Accident Site:	0°
Lowest Cloud Condition:	Clear / 0 ft agl	Visibility	70 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	7 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	180°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:		Temperature/Dew Point:	-18°C / -18°C
Precipitation and Obscuration:			
Departure Point:	GRAND JUNCTION, CO (GJT)	Type of Flight Plan Filed:	None
Destination:	MONTICELLO, UT (U43)	Type of Clearance:	None
Departure Time:	1445 MDT	Type of Airspace:	

## Wreckage and Impact Information

Crew Injuries:	3 None	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	3 None	Latitude, Longitude:	

## Administrative Information

Investigator In Charge (IIC):	VERLIN B TRANTER	Report Date:	02/08/1993
Additional Participating Persons:	DICK MASON; SALT LAKE CITY, UT		
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 <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

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](#).