



Australian Government

Australian Transport Safety Bureau

Total power loss involving a Bell 206B, VH-NDL

179 km SE of Alice Springs Airport, Northern Territory, 12 November 2013

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Addendum

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Total power loss involving a Bell 206B, VH-NDL

What happened

On 12 November 2013, a Bell 206B helicopter, registered VH-NDL, departed a camp site located 51 NM SE of Alice Springs, Northern Territory, on a charter flight with a pilot and three passengers on board. The flight was conducted in visual meteorological conditions. About an hour into the flight and 2 NM from the landing area, the pilot commenced a slow descent from 2,000 feet above the ground (AGL). When lowering the collective, the pilot heard an intermittent grinding noise above the cockpit. The pilot checked the gauges, with nothing unusual noted. The noise continued to develop and the pilot elected to land. As the helicopter descended through 400 feet, a clunking noise was heard and power was lost to the main rotor. The pilot initiated an auto rotation and briefed the passengers for an emergency landing. During the touch down at about 0705, the main rotor blade severed the tail boom (Figure 1). The pilot secured the helicopter, waited for the main rotor to slow and assisted the passengers to exit. The helicopter sustained substantial damage; the occupants were not injured.

Figure 1: VH-NDL



Source: Aircraft operator

Pilot comment

The pilot reported that as part of the pre-flight inspection that day, the main driveshaft was checked and everything appeared normal with no evidence of grease leakage and the Temp-Plate indicators (which change colour to indicate when there has been excess temperature) showing no sign of a colour change.

Operator investigation

The operator determined that the engine-transmission main drive shaft¹ had failed due to the failure of the forward drive shaft boot. They reported that, during the week prior to the accident, the helicopter had operated short flights to landing areas with extended ground running, in high temperatures and with the helicopter loaded to near its maximum all up weight.

The operator reported that the main drive shaft was inspected and lubricated and the forward and rear boots replaced every 300 hours (time in service) or 3-monthly calendar time intervals and that the manufacturer’s requirement was 600 hours (time in service) or 6-monthly calendar time intervals.

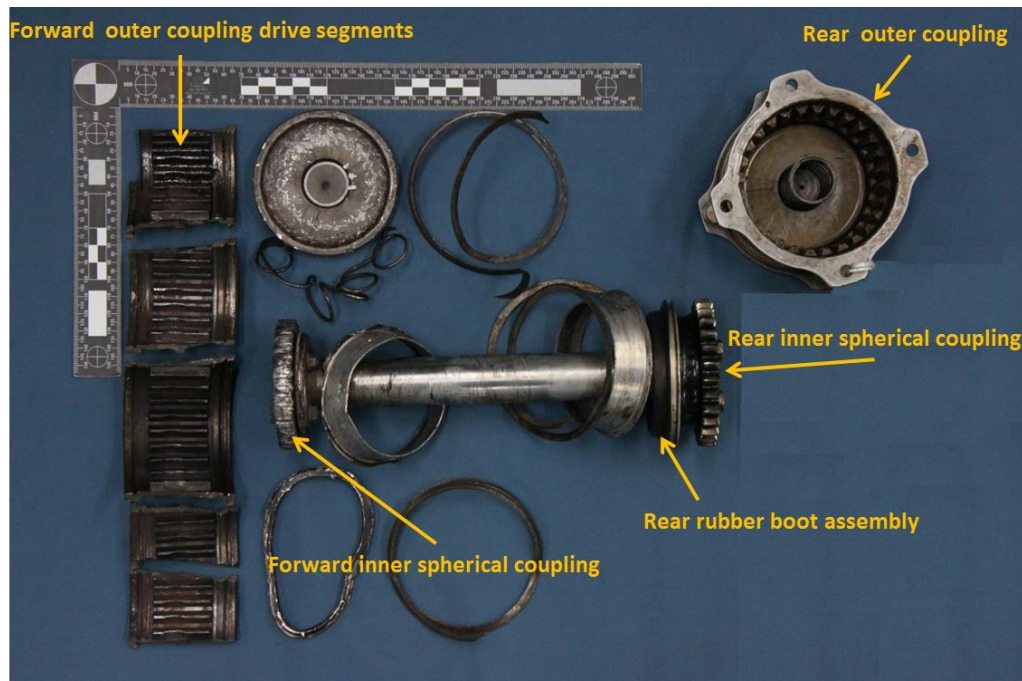
The main drive shaft installed on NDL failed about 603.4 hours after it was overhauled. It had been inspected and lubricated and the forward and rear boots were replaced about 132.7 hours prior to the accident.

ATSB examination of main drive shaft

The following are the results of ATSB examination of the main drive shaft, which was supplied by the Civil Aviation Safety Authority (Figure 2).

The forward outer coupling had failed, in overload, into five segments. The surfaces of the segments had evidence of discolouration due to over-temperature and most of the surfaces had turned into red oxide (which forms in air at high temperatures, estimated to be over 500 °C). There was no detected grease that is needed for lubrication to reduce friction (heat) between the rotating parts. Without the grease, the gear teeth on the forward inner spherical coupling softened, deformed, fractured and became jammed, resulting in the forward outer coupling shattering into the five segments. The four Temp-Plate indicators (which indicate when there has been excess temperature) were not present on the forward outer coupling exterior. There were no detected remnants of the forward rubber boot that is part of the seal assembly for containment of the grease.

Figure 2: Main drive shaft VH-NDL



Source: ATSB

¹ The main drive shaft forms a means of transmitting power from the engine to the main rotor transmission assembly.

The rear outer coupling and rear inner spherical coupling were well lubricated and exhibited normal condition. All four Temp–Plate indicators were attached to the rear outer coupling exterior, with no apparent indication of an over-temperature. The rear rubber boot, which is part of the seal assembly for containment of the grease, was flexible and undamaged.

Transport Canada service history review

Transport Canada conducted a service history review for main drive shaft failures and defects covering the last 10 years on Bell 206 series helicopters. Transport Canada did not identify any sudden uncontained main drive shaft failures with subsequent power loss.

Safety action

Whether or not the ATSB identifies safety issues in the course of an investigation, relevant organisations may proactively initiate safety action in order to reduce their safety risk. The ATSB has been advised of the following proactive safety action in response to this occurrence.

Helicopter operator

As a result of this occurrence, the helicopter operator has advised the ATSB that they are taking the following safety actions:

- Replace the main drive shaft assembly with a KAflex drive shaft system to all operator effected helicopters.

General details

Occurrence details

Date and time:	12 November 2013 – 0705 CST	
Occurrence category:	Accident	
Primary occurrence type:	Total power loss	
Location:	179 km SE of Alice Springs Airport, Northern Territory	
	Latitude: 24° 56.50' S	Longitude: 135° 09.35' E

Aircraft details

Manufacturer and model:	Bell 206B (III)	
Registration:	VH-NDL	
Serial number:	2710	
Type of operation:	Charter	
Persons on board:	Crew – 1	Passengers – 3
Injuries:	Crew – Nil	Passengers – Nil
Damage:	Substantial	

About the ATSB

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The ATSB is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; and fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as

well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

About this report

Decisions regarding whether to conduct an investigation, and the scope of an investigation, are based on many factors, including the level of safety benefit likely to be obtained from an investigation. For this occurrence, a limited-scope, fact-gathering investigation was conducted in order to produce a short summary report, and allow for greater industry awareness of potential safety issues and possible safety actions.