Chief Inspector of Accidents
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Accident Bulletin 1/2012

(An Update Bulletin to Accident Bulletin 2/2011)

Aircraft type:	Eurocopter AS332 L2 Super Puma
Registration:	B-HRN
Year of manufacture:	2001
Number and type of engines:	Two Turbomeca Makila 1A2 turboshaft engines
Date and time of accident:	27 December 2010 at 0237 hours UTC (1037 local time)
Place of accident:	Shing Mun Reservoir, New Territories, Hong Kong
Nature of Accident:	The helicopter was lifting an underslung water bucket filled up with water at Shing Mun Reservoir for fire-fighting operation. When the helicopter was on transition to forward flight, the No. 2 engine shut down automatically. The captain decided to ditch the helicopter into the reservoir. All crew members onboard evacuated the helicopter without injury.
Type of flight:	Aerial Work (Fire fighting operated by a government agency)
Persons on board:	Crew : 3 Passenger : Nil
Fatalities:	Nil
Serious Injuries:	Crew : Nil
Commander's licence:	Hong Kong Airline Transport Pilot's Licence (Helicopters)
Commander's age:	33
Commander's experience:	3,373 hours (of which 1,917 were on type)
Other crew	Flight Deck : One co-pilot Cabin : One aircrewman
Source of information:	Inspector's Investigation

Update on Investigation into
Aircraft Accident to the Government Flying Service Eurocopter AS332 L2, B-HRN
during Fire Fighting Operation on 27 December 2010

(All times are in UTC. Hong Kong time is UTC+8 hours.)

1. The Civil Aviation Department (CAD) of the Government of the Hong Kong Special Administrative Region reported in Accident Bulletin 2/2011 that an analysis was carried out on the data in the combined voice and flight data recorder (CVFDR). The results revealed that the helicopter had experienced a power turbine overspeed on No. 2 engine, and the overspeed caused an automatic shutdown of the engine.

2. The investigation into the causes of the power turbine overspeed is being conducted by CAD with the assistance from the Bureau d'Enquêtes et d'Analyses pour la sécurité de l'aviation civile (BEA), Eurocopter, the helicopter manufacturer and Turbomeca, the engine manufacturer. This Bulletin provides an update, in accordance with ICAO Annex 13, on the progress of the investigation.

3. The data in the Health and Usage Monitoring System (HUMS) computer were analysed and no anomaly was found related to this accident. In addition, a review of the flight documents and maintenance records also did not identify abnormality. Moreover, the examination of the fuel samples taken from the helicopter after the accident confirmed that the fuel met the relevant specifications. The sensors for measurement of the engine power turbine rotational speed were also checked and their functionality was found normal.

4. The two digital engine control units (DECU) were examined by Turbomeca. The results indicated a correct operation of both DECUs during the accident – engine No.2 DECU commanded an engine shutdown through the overspeed protection system and inhibited No.1 DECU overspeed shutdown system. In other words, the overspeed function of either DECUs was in compliance with the manufacturer's technical specifications.

5. A spectral analysis on the cockpit ambient sound recording was conducted by the BEA. The analysis showed that there was a noticeable increase in the rotational speed of engine power turbine just before No.2 engine automatically shut down. The analysis of the CVFDR data confirmed that the noticeable increase of power turbine rotational speed occurred in No.2 engine.

6. The investigation so far did not identify evidence indicating that there was any anomaly internal to engine. Since the power turbine of both engines is a free turbine and it is mechanically connected to the corresponding freewheel unit inside the MGB, the team pursued investigation into a genuine overspeed of No.2 engine power turbine due to possibly a momentary 'disconnect' from the MGB.

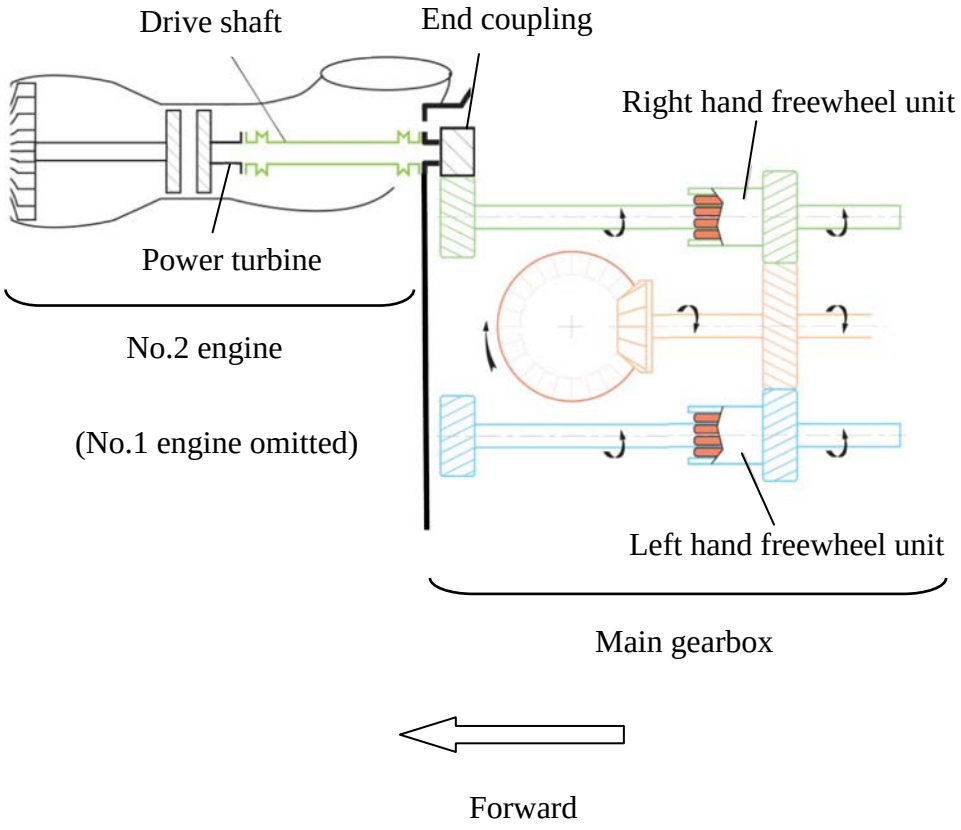

Figure 1 AS332 L2 Super Puma Engine to Main Gearbox Connection Configuration

7. The MGB, including the two freewheel units inside, were closely examined. There were no signs of damage. The condition of the right freewheel unit was similar to other freewheel units observed in overhaul, except that the level of fretting wear on the ramps of the freewheel shaft was a little higher than usual. On two of the ramps, there were signs and marks of roller sliding longitudinally. On other ramps, vertical scratch marks and metal pickup were observed indicating that the rollers could have slipped.

8. The accident investigation is on-going with the focus on confirming whether the slippage of the right freewheel unit had occurred leading to the power turbine overspeed and the subsequent automatic shutdown.

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