

**KOMISI
PENELITIAN PENYEBAB KECELAKAAN
PESAWAT UDARA**

DEPARTEMEN PERHUBUNGAN

LAPORAN NO 2/98

**Kecelakaan Pesawat Udara
PT DERAZONA AIR SERVICE
BELL 206B, PK-DBA
3 Juni 1998**

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**GEDUNG KARSA, LT2, DEPARTEMEN PERHUBUNGAN,
JL. MEDAN MERDEKA BARAT 8, JAKARTA 10110**

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AIRCRAFT ACCIDENT INVESTIGATION COMMISSION
DEPARTMENT OF COMMUNICATION

GFDUNG KARSA LT2, DEPARTEMEN PERHUBUNGAN JL MEDAN MERDEKA BARAT 8, JAKARTA 10110, PH/FX ++62213517606

Report of Incident

Owner		PT Derazona Air Service
Operator		PT Derazona Air Service
Aircraft	Type	Bell 206B
	Registration	PK-DBA
	Flight Number	
Location of occurrence		06 ⁰ 11.14(S) 108 ⁰ 25.85(E)
Date		June 3, 1998
Time		00.06 UTC

Synopsis

On June 3, 1998, the helicopter with registration number PK-DBA departed from its base at 06005.46 S / 108008.17 E, with three passengers on a ferry flight to destination 06⁰17.11 S / 108⁰37.50 E. Time of departure was 23:51 UTC. At 00:06 UTC pilot reported an engine power loss and proceeding to prepare for ditching. At 01:00 UTC the aircraft was located floating and all occupants evacuated. Cause of power loss was attributed to a faulty fuel pump.

1 Factual Information

1.1 History of the flight

On June 3, 1998, the helicopter with registration number PK-DBA departed from its base at 06⁰05.46 S / 108⁰08.17 E, with three passengers on a ferry flight to destination 06⁰17.11 S / 108⁰37.50 E. Time of departure was 23:51 UTC. At 00:06 UTC pilot reported an engine power loss and proceeding to prepare for ditching. At 01:00 UTC the aircraft was located floating and all occupants evacuated.

1.2 Injuries to persons

Injuries	Flight crew	Cabin Crew	Passengers	Total
Fatal	--	--	--	--
Serious	--	--	--	--
Minor / None	1	--	3	4
Total	1	--	3	4

1.3 Damage to aircraft

None.

1.4 Other damage

None

1.5 Personnel Information

1.5.1 Pilot

Captain Pilot	Male, aged 38 years	
License	ATPL - Instrument - No 3378	
Issued	07.11.92	
Valid until	28.11.98	
Instrument Rating	Licence No d.n.a.	
Issued	d.n.a.	
Valid until	d.n.a.	
Last Proficiency check	Bell412	21.02.98
	Bell206	17.04.98
Last Medical check	28.05.98	

Total Flight Time	5,582.9 hrs
Total Helicopter	5,705.4 hrs
Bell 212/412	2,748.3 hrs
Bell 206B	2,872.8 hrs
Total Fixed Wing	.147.5 hrs

1.5.2 First Officer

<not applicable>

1.5.3 Cabin Attendants

<not applicable>

1.6 Aircraft information

1.6.1 Airframe

Manufacturer	Bell Helicopter	
Model	Bell 206B	
Date of Manufacture	Nov 1967	
Serial Number	110	
CoA	15.07.98	
CoR	22.07.98	
Compass swing	06.07.98	
Weight & Balance	05.07.99	
Total flight time	19,882.8 hrs	
Last 90 days	Bell412	101.1 hrs
	Bell206B	0.6 hrs
Last 72 hours	Bell412	0.0 hrs
	Bell206B	7.8 hrs
Last 48 hours	Bell412	0.0 hrs
	Bell206B	5.2 hrs
Total cycles	d.n.a.	

1.6.2 Power Plants

Manufacturer	Allison Engine Company
Model	250-C20
Serial Number	CAE-822327
Date of Manufacture	Nov 1974
Total flight time	7,128.9 hrs
Total cycles	d.n.a.

1.6.3 Fuel pump

Manufacturer Chandler-Evans Control Systems Div.; West Hartford
CT06133-0651
Model MFP-263
Part Number 113300-02A1 (Allison P/N 23065132)
Serial Number AKV0393
Total Service Time: 844.9 hrs

1.7 Meteorological Information

Ceiling clear sky
Temperature 28°C
Visibility 15 km
Wind velocity 07 kts
Wind direction Easterly

1.8 Aids to navigation

<not applicable>

1.9 Communications

<not applicable>

1.10 Aerodrome information

<not applicable>

1.11 Flight recorders

<not applicable>

1.12 Wreckage and impact information

No damage to aircraft. Aircraft ditched in shallow water near coast of West Java.

1.13 Medical information

<not applicable>

1.14 Fire

<not applicable>

1.15 Survival aspects

Aircraft remained floated on the calm sea. Crew and passengers evacuated aircraft without any problem.

1.16 Organizational and management information

<not applicable>

1.17 Tests and research

The loss of engine power was suspected due to a malfunction of the engine fuel pump. The pump was removed from the aircraft and taken to the Metallurgical Laboratory of the Institut Teknologi Bandung for inspection. Record showed that regular inspections were made in compliance of Allison 250-c20 Alert Commercial Engine Bulletin CEB A1253, dated August 21, 1997. No abnormalities were detected or reported during six (6) inspections done in 03.10.97 (346.6 hrs), 11.11.97 (428 hrs), 06.01.98 (549.1 hrs), 28.02.98 (638.3 hrs), 07.04.98 (724.1 hrs) and 20.05.98 (821.1 hrs).

The drive spline was inspected and found to be worn out, such that no torque could be transmitted from the engine to the fuel pump. Two test methods were applied, a metallography test to check the macro and microstructure of the spline, and a microhardness test. For the metallography test the spline was cut longitudinally in two halves by means of electro discharge machining. The macrograph indicated signs of wear on the spline, and further tests showed that the surface hardening of the spline did not penetrate deeply into the bulk of the shaft, which remains soft. A series of microhardness tests was then conducted using the Vickers' method with a loading of 200 grams each. This test strengthened the first findings, showing that the hardened surface layer was quite thin or shallow. The thickness of the hardened (hardness) layer at location A (see fig. 1) at the gear end was found to be 0.3 mm, at section B-D (the spline) the thickness was 0.2-0.3 mm and at section t-E (midway on the spline) the thickness was 0.1 mm.

A second fuel pump of the same make (serial number AKV0395, and total service time of 81.0 hrs) was also inspected at the Metallurgical Laboratory of the Institut Teknologi Bandung. This pump was reported in serviceable condition and was removed from the engine of another helicopter for comparison with the first pump.

2 Analysis

The wear at the spline section will result in some backlash. Inspection method is to check the wear by measuring the backlash at 100 hours intervals. These inspections were done in compliance to the Alert Commercial Service Bulletin CEB A-1253 Of 12.08.97, However, although the wear was later found to be in excess of the tolerable and allowable limits, there were indications that the backlash was not detected through these inspections. There were indications that the inspection procedure was not completely followed, which is to be done with the shaft pulled out.

3 Conclusions

3.1 Findings

The results of the tests showed that the fuel pump spline was severely worn out. This was due to a rate of wear which is faster than expected, aggravated by the relatively thin hardness surface layer of the spline.

No torque could thus be transmitted, resulting in a fuel flow stoppage and subsequently an engine power loss.

3.2 Significant factors

There were indications that the periodic inspections were done with a slight deviation of the inspection procedure, which may have resulted in an undetected slack of the spline.

3.3 Safety actions and recommendations

It is recommended that the air-operator maintenance inspection should follow strictly the instructions as per Allison 250-c20 Alert Commercial Engine Bulletin CEB A-1253, dated August 21, 1997.

The fuel pump manufacturer should be made aware of the thinness of the hardness layer and review both the design and the hardening process during the manufacture of the spline.

Until these review of the design and manufacture of the fuel pump by the manufacturer, it is recommended not to use the same type and model of the fuel pump involved.

Appendices

Test Report, Laboratorium of Metallurgy, Institut Teknologi Bandung.