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**NATIONAL
TRANSPORTATION
SAFETY
COMMITTEE**

Aircraft Accident Investigation Report

**PT. Derazona Air Service
Bell 206 B Jet Ranger ; PK-DAT
Labih Ricefield, Labih Village, Gianyar, Bali
Republic of Indonesia**

23 April 2008



**NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2012**

This Final Report was produced by the National Transportation Safety Committee (NTSC), Ministry of Transportation Building 3rd Floor, Jalan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the investigation carried out by the NTSC in accordance with Annex 13 to the Convention on International Civil Aviation, the Indonesian Aviation Act (UU No. 1/2009) and Government Regulation (PP No. 3/2001).

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GLOSSARY OF ABBREVIATIONS

AD	Airworthiness Directive
AFM	Airplane Flight Manual
AGL	Above Ground Level
ALAR	Approach-and-landing Accident Reduction
AMSL	Above Mean Sea Level
AOC	Air Operator Certificate
ATC	Air Traffic Control
ATPL	Air Transport Pilot License
ATS	Air Traffic Service
Avsec	Aviation Security
BMKG	Badan Meterologi, Klimatologi dan Geofisika
BOM	Basic Operation Manual
°C	Degrees Celsius
CAMP	Continuous Airworthiness Maintenance Program
CASO	Civil Aviation Safety Officer
CASR	Civil Aviation Safety Regulation
CPL	Commercial Pilot License
COM	Company Operation Manual
CRM	Cockpit Recourses Management
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DGCA	Directorate General of Civil Aviation
DME	Distance Measuring Equipment
EFIS	Electronic Flight Instrument System
EGT	Exhaust Gas Temperature
EIS	Engine Indicating System
FL	Flight Level
F/O	First officer or Co-pilot
FDR	Flight Data Recorder
FOQA	Flight Operation Quality Assurance
hPa	Hectopascals
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
IIC	Investigator in Charge

ILS	Instrument Landing System
Kg	Kilogram(s)
Km	Kilometer(s)
Kt	Knots (NM/hour)
Mm	Millimeter(s)
MTOW	Maximum Take-off Weight
NM	Nautical mile(s)
KNKT / NTSC	Komite Nasional Keselamatan Transportasi / National Transportation Safety Committee
PIC	Pilot in Command
QFE	Height above aerodrome elevation (or runway threshold elevation) based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
RESA	Runway End Safety Area
RPM	Revolution Per Minute
SCT	Scattered
S/N	Serial Number
TSN	Time Since New
TT/TD	Ambient Temperature/Dew Point
TTIS	Total Time in Service
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

INTRODUCTION

SYNOPSIS

On Wednesday dated 23 April 2008, a Bell 206 B Jet Ranger helicopter, registered PK-DAT, was being operated by PT. Derazona Air Service on unschedule passenger flight from Ngurahrai Airport, Denpasar, Bali to Kintamani, Bali. The aircraft departure from Denpasar at 0020 UTC (Universal Time Coordinate/08:20 LT) and carried the foreign tourists and flight for one hour. The aircraft landed at Denpasar at 0120.

The helicopter was refuelling and at 0200, the helicopter was flying for 2 hours 30 minutes and carried four passenger tourists for Bali Tour.

After the aircraft flew for 1 hour 45 minutes, the aircraft has a power loss. The pilot has decision for emergency landing.

The aircraft landed in the ricefield, Pantai Kramas Area, Labih Villages, Gianyar, its about 60 meters from beach, coordinate 08° 34' 736" S 115° 21' 460" E at 0338.

The pilot and passenger were safely and the aircraft was substantial damaged.

1 FACTUAL INFORMATION

1.1 History of the flight

On 22 April 2008 at 2230 UTC (Universal Time Coordinate or local time 06:30 dated 23 April 2008), the engineer performed Daily Check Inspection to a Bell 206 B Jet Ranger helicopter, registered PK-DAT will be perform for Joy Flight.

On Wednesday dated 23 April 2008, a Bell 206 B Jet Ranger helicopter, registered PK-DAT, was being operated by PT. Derazona Air Service on unschedule passenger flight as a joy flight from Ngurahrai Airport, Denpasar, Bali to Kintamani, Bali. The aircraft departed from Denpasar at 0020 to carried the foreign tourists and flight for one hour. The aircraft landed at Denpasar at 0120.

The helicopter was refuelling and at 0200 the helicopter continued to flight to carried four passenger tourists for Bali Tour. The aircraft will perform flight for 2 hours 30 minutes. The aircraft will flight along the Tanah lot, Bedugul, Kintamani and Besakih, the to the East Bali.

After the aircraft flew within 1 hour 45 minutes around Sanur, suddenly the Pilot felt the nose aircraft was drop, he looked at Turbine Indicator (N2) the aircraft has experienced engine power loss, then the pilot decision for emergency landing. The pilot performed the engine shutdown procedure.

The aircraft landed in the ricefield, Pantai Kramas Area, Labih Villages, Gianyar, its about 60 meters from beach, coordinate 08° 34' 736'' S 115° 21' 460'' E at 0338.

The pilot and four passengers were safely and the aircraft was substantial damaged.



Figure 1: The aircraft condition after accident

1.2 Injuries to persons

Injury	Flight crew	Passengers	Total in Aircraft	Others
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	1	4	5	-
TOTAL	1	4	5	-

1.3 Damage to aircraft

The aircraft was substantial damaged, the severe damaged was as follows:

- The tail boom was broken;
- The tail rotor blade damaged;
- The right attachment skid was broken;
- The rotor blade damaged.

1.4 Other damage

There was no other damage to other property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in command

Gender	:	Male
Age	:	56 years
Nationality	:	Indonesian
License	:	Air Transport Pilot License
License validity	:	31 August 2008
Type rating	:	Bell 206, Bell 412
Instrument rating validity	:	31 August 2008
Last medical check-up	:	13 February 2008
Total flight hours	:	8,370 hours 36 minutes
This make and model	:	4,589 hours 42 minutes
Last 90 days	:	56 hours 36 minutes
Last 30 days	:	12 hours 12 minutes
Last 3 days	:	3 hours 42 minutes
Last 24 hours	:	3 hours 30 minutes
This Flight	:	1 hours 45 minutes

1.6 Aircraft Information

1.6.1 Aircraft data

Manufacturer	:	Bell Helicopter Textron USA
Model	:	Bell 206 Jet Ranger
Serial number	:	1625
Registration	:	PK-DAT
Nationality	:	Indonesia
Year of manufacture	:	1972
Certificate of airworthiness Validity	:	20 June 2008
Certificate of registration Validity	:	11 June 2009
Total time since new	:	14,786 hours
Total cycles since new	:	57,895 cycles
Last major inspection (1,200 hours)	:	13,781 hours 30 minutes
Last minor inspection (100 hours)	:	14,766 hours

1.6.2 Engine data

Manufacturer : Rolls Royce
Model : Allison 250-C20
Type / Model : 250-C20
Serial number : CAE 822339
Time since new : 19,339 hours 36 minutes
Cycle since new : 25,584 cycles

1.6.3 Maintenance data

The aircraft maintenance data or pilot report on the Aircraft Maintenance Logs shows that the aircraft was airworthy and did not found a trouble.

1.7 Meteorological information

The meteorological data issued by Meteorology office Station Tarakan, East Kalimantan reported visibility was 10,000 meters, and weather was cleared.

1.8 Aids to navigation

Not relevant to this accident.

1.9 Communications

Not relevant to this accident.

1.10 Aerodrome information

The aircraft landed in the rice-field, for about 60 meters from beach and 100 meters from highway.

1.11 Flight Recorders

The aircraft was not fitted with a flight data recorder or cockpit voice recorder. Neither recorder was required by current Indonesian civil aviation regulations.

1.12 Wreckage and impact information

The aircraft emergency landed in the rice-field, for about 60 meters from the beach. The tail-boom was broken by main rotor shaft, during the aircraft impact to the ground.

1.12.1 Tail Boom

The tail boom was broken by main rotor shaft, during the aircraft impact to the ground.



Figure 2: The tail boom was broken



Figure 3: A right torn leads to the tail boom

1.12.2 Tail Rotor

The tail rotor was detached from the helicopter; the wreckage was not far from the helicopter.



Figure 4: The tail rotor wreckage



Figure 5: The tail rotor blade was broken

1.12.3 Skid

The helicopter skid was bent due to the aircraft impacted with the ground.



Figure 6: The forward right skid was bent



Figure 7: Aft right skid was bent

The fwd right attachment skid torn and detached.



Figure 8: The fwd right attachment skid torn and detached

1.12.4 Main Rotor Blade

The main rotor blade was damage; caused impact by the ground.



Figure 9: The main rotor blade surface marking



Figure 10: The main rotor blade surface marking caused impact to the ground



Figure 11: The main rotor blade trailing edge was bent caused impact

1.13 Medical and pathological information

There was no evidence of physiological factors affected the pilot performance.

1.14 Fire

There was no pre or post-impact fire.

1.15 Survival aspects

The aircraft emergency landed in the rice-field. After the aircraft landed, the pilot instructed to the passenger to stay away from the aircraft to avoid the possibility of explosion. After a while, there was no explosion, the pilot returned to the aircraft to contact the ATC Ngurah Rai informed the accident happen. This accident was survivable.

1.16 Tests and research

Not relevant to this accident.

1.17 Organisational and management information

Aircraft operator : PT. Derazona Air Service
Aircraft owner : PT. Derazona Air Service
Address : Halim Perdana Kusuma Airport
Jakarta 13610 Indonesia
Certificate Number : 135-010

1.18 Additional information

1.18.1 Engine

Investigation found that the plumbing connection (B Nut) detached. If the B nut still attached mark by torque paint



Figure 12: The engine Allison 250-C20

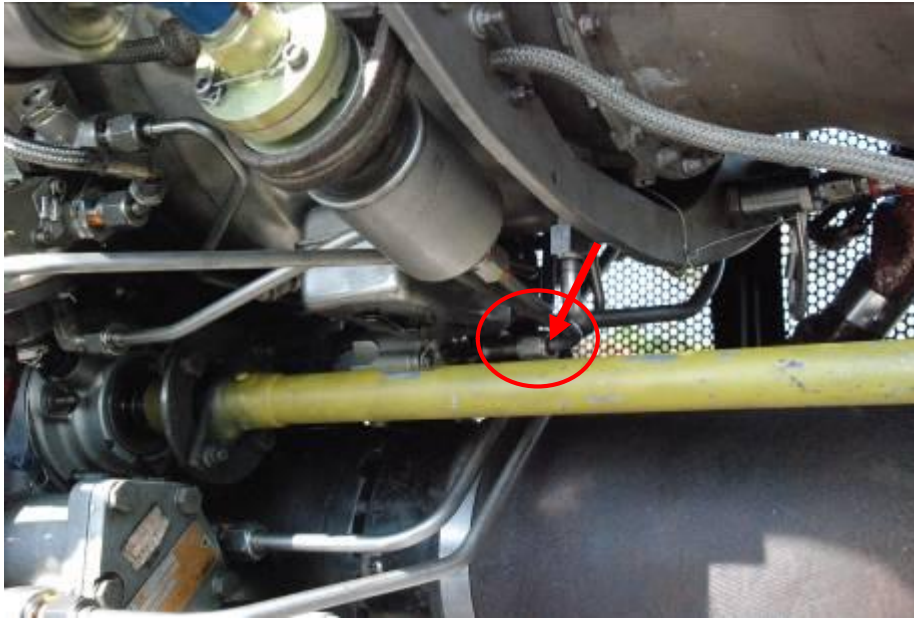


Figure 13: The plumbing connection (B Nut) position detached

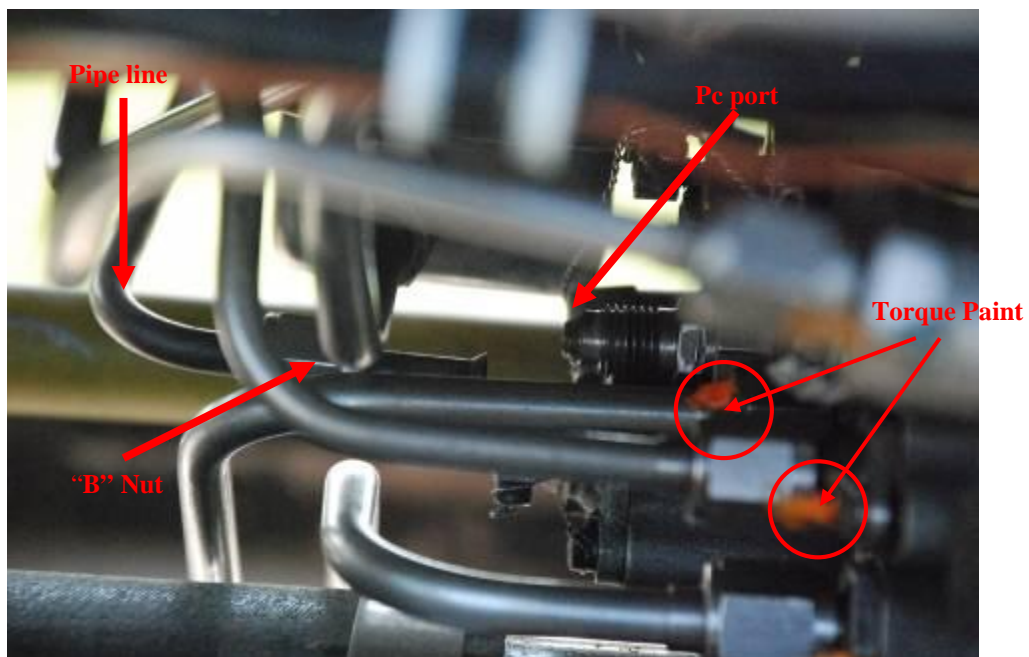


Figure 14: The plumbing connection (B Nut) detached, the B nut still attached mark by torque paint

1.18.2 Fuel control system

The gas producer fuel control and power turbine governor provide speed governing of the power turbine rotor and overspeed protection for the gas procedure rotor system. The fuel control system is pneumatic-mechanical and sense N1 and N2 speeds, compressor discharge air pressure (Pc), and twist grip position to regulate and maintain fuel flow within established limits.

Fuel flow is function of P_c as sensed in the gas producer fuel control. Variations in fuel flow schedules are obtained by modulating the P_c pressure to P_x and P_y pressures in the gas producer fuel control through the bleed-down circuit actuated by the governors sensing N1 RPM and N2 RPM. The design of the fuel control system is based upon controlling the engine power output by controlling N1 RPM. With the twist grip in ground idle, N1 RPM is controlled by the gas producer fuel control. With the twist grip in full open and N2 RPM at the setting of the power turbine governor, N1 is established by power turbine governor action upon the gas producer fuel control.

While gas pressure enters the space P_x and P_y bleed was greater, then the opening of the fuel metering valve and also greater and the fuel coming out of the FCU is also growing, but if the P_c tube despite the outside air pressure (P_a) will enter into the inlet port P_c , and then enter the room P_x and P_y bleed, resulting in bellows will move to positions of normal and metering valve moves toward the idle position.

The P_c port is a Fuel Control Unit (FCU) is connecting with N1 compressor pressure, for control the fuel metering valve.

1.19 Useful or Effective Investigation Technique

The investigation is being conducted in accordance with NTSC approved policies and procedures, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

The investigation found the Pc port of B-nut FCU was detached, indicated there was no slippage marks (torque paint).

The Metering Valve Section schematic shows B Nut detached from Pc port, the fuel flow output automatic on idle position, because there is no pressure from the compressor flows into the Px and Py bleed for move Governor Bellows and Bellows Acceleration.

The detached Pc port of B-nut can made the air pressure changed in the Px and Py bleed the same with the outside air pressure (Pa), then the two Bellows of different sizes will return to its original position. This resulted in the fuel valve will in the "Idle" position; although the grip is positioned to set the engine RPM to high RPM, the engine rotation still the same because the fuel valve is open. The engine still worked in a low rpm or "Idle".

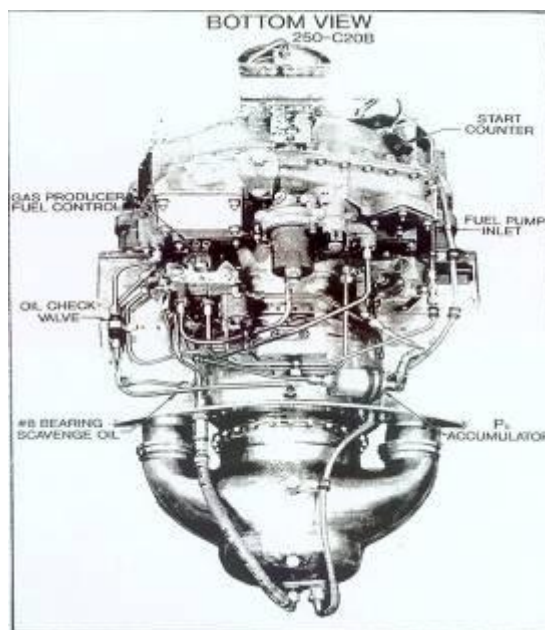
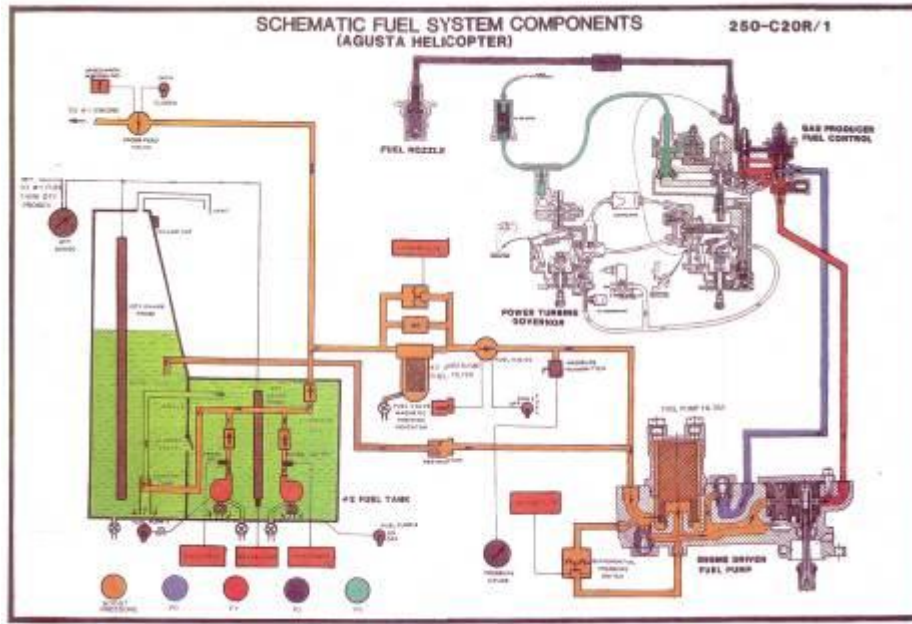
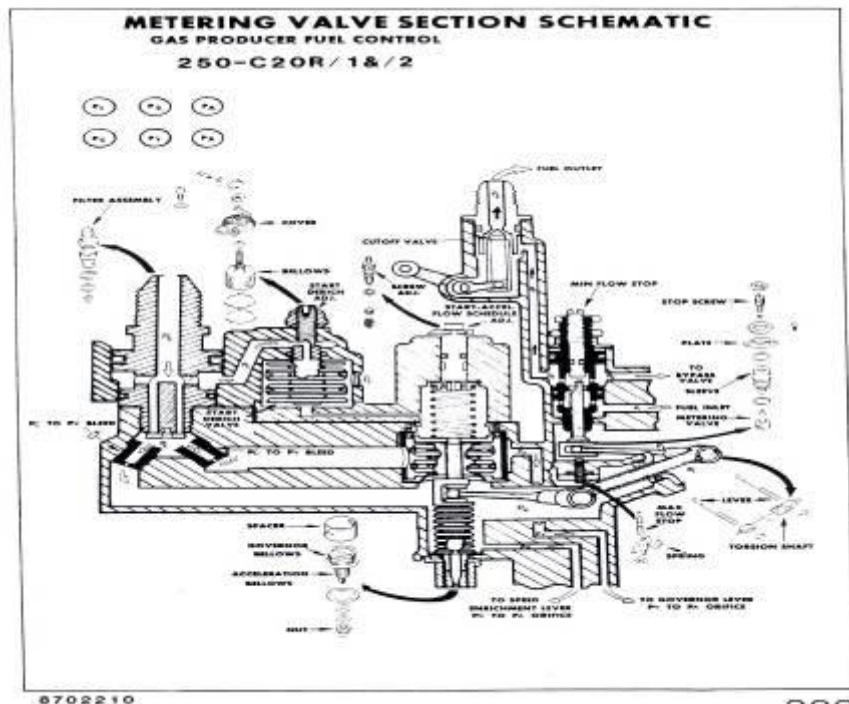


Figure 15: Pc port detached



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Figure 16: The fuel system engine Allison 250-C20 schematic and Pc port position



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Figure 17: The Metering Valve Section schematic

3 CONCLUSIONS

3.1 Findings

- The crew were hold valid license;
- The aircraft had valid certificate of airworthiness and certificate of registration;
- The plumbing the Pc port of B Nut FCU was detached, indicated by no slippage marks (torque paint).
- The Pc port of B Nut FCU was detached, the fuel flow output automatic on idle position, because there is no pressure from the compressor flows into the Px and Py bleed for move Governor Bellows and Bellows Acceleration.

3.2 Causes

The helicopter engine has no power, caused no pressure from compressor. There was effect from the Pc port of B-nut FCU detached.

4 SAFETY ACTION

4.1 Airworthiness Directive

The Airworthiness Directives AD NO.2004-0009 R1 (date 3 Feb. 2005) from EASA mentions the problems that occurred in an ATA 73 (engine control system pipes - Inspection) relating to accidents due to the release of "B" Nut on the FCU.

No later than 50 flight hours from the effective date, inspect all control system plumbing connecting the Gas Producer fuel control, the Power Turbine governor, and the compressor (Pc, Py, Pr, Pg, Po, P1, P2, pipelines) for condition and proper assembly including the correct torque values and the slippage marks (torque paint) at the B-nut by using proper tooling in accordance with the appropriate Allison (now Roll Royce Corp.) operations and maintenance manual in association with the particular Allison (now Roll Royce Corp.) Alert Commercial Service Letter which pertain to the same object Reference CSL-A-169, A-1166, A-2113, A-3117 and A-4036.

The B-nut torque values must be recorded in the relevant aircraft technical records.

Repeat inspection at any subsequent disturbance for whatever reason of the above nominated plumbing involving either single pipe or multiple pipe maintenance activities.

This inspection shall require disturbed pipe(s) to be inspected at both ends, reassembled by applying the correct torque values and the slippage marks (torque paint) at the b-nut and inspected for leakage in accordance with the procedures of the appropriate Allison Operation and Maintenance Manuals and this Directive. Entry must be made in the engine log book when the inspection is completed.

The B-nut torque values must be recorder in the relevant aircraft technical records.

The Airworthiness Directives AD NO.2004-0009 R2 (date 25 November 2005) from EASA mentions the problems that occurred in an ATA 73 (engine control system pipes - Inspection) relating to accidents due to the release of "B" Nut on the FCU.

1. Inspect the 'B'-nuts of all control system plumbing connecting the Gas Producer Fuel Control, the Power Turbine Governor, or the Compressor (Pc, Py, Pr, Pg, Po, P1, P2, pipelines) for indication of slippage at intervals not exceeding 100 hours.
2. During maintenance which involves disturbing any control system plumbing connecting the Gas Producer Fuel Control, the Power Turbine Governor, or the Compressor (Pc, Py, Pr, Pg, Po, P1, P2, pipelines),:-
 - a) Comply with the requirements of Allison (now Rolls Royce Corp.) Alert Commercial Service Letter Reference CSL-A-

169, A-1166, A-2113, A-3117 and A-4036
Recommendations 2 to 9 and 11 to 16.

- b) Record the 'B'-nut torque values in the relevant aircraft technical records.

Revision 1 is raised to clarify the pipes affected by this AD.

Revision 2 is raised for the following reasons:-

1. To clarify that the repetitive 100 hour visual inspection for 'B'-nut slippage is required for compliance.
2. To delete the initial detailed inspection. This is now only required when the pipes are disturbed for some other reason. This change is to minimise the risk of maintenance error.
3. To delete reference to Recommendation 1 of the Alert Commercial Service Letter, which is contrary to other EASA requirements.

5 SAFETY RECOMMENDATIONS

As a result of the investigation into this accident, the National Transportation Safety Committee issues the following recommendations.

5.1 Recommendation to the Directorate General Civil Aviation

The National Transportation Safety Committee recommends that the Directorate General Civil Aviation to ensure the operators which operation engine Allison Model 250 series should follow the EASA Airworthiness Directive 2004-0009 R2.

6 APPENDIX

EASA Airworthiness Directive