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دولة الامارات العربية المتحدة
الهيئة العامة للطيران المدني
UAE General Civil Aviation Authority

AIRCRAFT SERIOUS INCIDENT 17/2006

FINAL REPORT ON THE INCIDENT INVOLVING PAKISTAN CAA BEECHCRAFT SUPER KING AIR 200, REGISTRATION AP-CAA ON LANDING AT SHARJAH INTERNATIONAL AIRPORT, UNITED ARAB EMIRATES ON 26th NOVEMBER, 2006

INTRODUCTION

SYNOPSIS

The aircraft involved was a Beechcraft Super King Air 200, registration AP-CAA, owned and operated by the Pakistani CAA and based at Karachi in the State of Pakistan. The State of Pakistan was the State of Registry and State of the Operator. The United States of America was the State of Design and State of Manufacture of the aircraft.

The incident occurred when, during the landing roll at Sharjah International Airport, the LH MLG collapsed. The aircraft veered off the runway and stopped on the gravel strip midway down the runway. The crew of 6 on board exited the aircraft in the normal way and there were no injuries. The aircraft suffered damage to its LH Wing, LH propellers and in the area of the collapsed MLG.

The probable cause of the incident was the loss of rigging alignment of the LH MLG actuator which resulted in the collapse of the LG. The out of rig actuator of the LH MLG was caused by: 1) fatigued cracking of the ends of the bearing race 2) This loss of the bearing race would cause the actuator to loose extension and retraction rigging alignment, consequently, the drag brace rigging would be lost.

Three safety recommendations have been made.

Unless otherwise indicated, recommendations in this report are addressed to the Regulatory Authority of the State having responsibility for the matters with which the recommendation is concerned. It is for that Authority to decide what action is taken.

INCIDENT DETAILS

The incident details are as follows;

Registered Owner	:	Pakistan CAA
Registered Operator	:	Pakistan CAA
Aircraft type & model	:	Beechcraft Super King Air 200
Nationality	:	Pakistan
Registration	:	AP-CAA
Place of Incident	:	Runway 12 Sharjah International Airport, United Arab Emirates Latitude : 25° 19' 42" N Longitude : 55° 31' 66" E

Date & Time : 26th November, 2006
: 1150 hrs Local
: 0750 hrs UTC

Note: All times in this report are Coordinated Universal Time (UTC).

Persons on board : 2 Flight crew
: 3 Calibration crew
: 1 Ground Engineer

Fatalities : Nil

Injuries : Nil

ORGANISATION OF THE INVESTIGATION

The GCAA was immediately notified of the incident and an Investigation Committee was established identifying the GCAA as the Authority responsible for the conduct of the investigation. Notification to ICAO and applicable States was completed on the day of the incident. Officials from the following State of Operator/Registry and State of Manufacturer of the aircraft were granted Accredited Representation in accordance with ICAO Annex 13 and corresponding UAE Civil Aviation Regulations.

State of Registry/Operator - CAA, State of Pakistan
State of Design/Manufacture - NTSB, USA

The following GCAA personnel participated in the investigation:

Capt. Mahamad Bin Dan	Investigator In Charge/Operational Matters
Ahmed Al Rawahi	Airworthiness Matters
Lachlan Thurston	Aerodrome and ATC Matters

The technical investigation was closely coordinated and controlled by the GCAA during the initial onsite investigation and the collection of technical information as well as the examination of the components removed from the aircraft which was carried out by GAMCO and HBC.

FINAL REPORT

This Report was released on 23rd January 2008 by the GCAA under the authority of the GCAA Director General.

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ABBREVIATIONS USED IN THIS REPORT

Aft	Towards the rear of the aircraft
AIP	Aeronautical Information Publication (UAE)
AOM	Aircraft Operating Manual (Pakistan CAA)
ASDA	Accelerated Stop Distance Available
ATC	Air Traffic Control
CAA	Civil Aviation Authority
FC	Flying Cycles
ft	Foot/Feet
GAMCO	Gulf Aircraft Maintenance Company
GCAA	General Civil Aviation Authority (U.A.E.)
HBC	Hawker Beechcraft Corporation
hrs	hour(s)
HDG	Heading (Magnetic)
IAS	Indicated Air Speed
ICAO	International Civil Aviation Organisation
K	thousand
kg	Kilogram(s)
km	Kilometre(s)
kt	Knot(s)
L	Left
lbs	pound(s)
LDA	Landing Distance Available
LG	Landing Gear
LH	Left Hand

m	Metre(s)
M	Magnetic (heading)
MHz	Megahertz
min	Minute(s)
MLG	Main Landing Gear
MTOW	Maximum Take-off Weight
NLG	Nose Landing Gear
NOTAM	Notice to Airmen
nm	Nautical Mile(s)
OAT	Outside Air Temperature
PF	Pilot flying
PIAC	Pakistan International Airlines Corporation
P/N	Part Number
PSI	Pounds per Square Inch
QNH	Setting on altimeter sub scale to indicate altitude above mean sea level
RAK	Ras Al Khaimah
RFF	Rescue and Fire Fighting
RH	Right Hand
RT	Radio Telephony
RWY	Runway
sec	Second(s)
S/N	Serial Number
UAE	United Arab Emirates
UTC	Coordinated Universal Time
VMC	Visual Meteorological Conditions

1. FACTUAL INFORMATION

1.1 History of the flight

- 1.1.1 The aircraft, a Beechcraft Super King Air 200, registration and call sign AP-CAA, was operating a calibration flight from Sharjah International Airport, to RAK International Airport in the U.A.E. with the Captain designated as PF. On board there were 2 flight crew, 3 calibration crew and 1 ground engineer. The amount of fuel on board the aircraft on take-off was approximately 1400 lbs.
- 1.1.2 The crew did not notice anything unusual with the aircraft including the LG during the pre-departure checks which were duly completed including an external inspection of the aircraft. After engines start-up, at 0730 hrs the crew was cleared by ATC to taxi the aircraft to Runway 12. At 0732 hrs, the aircraft was cleared for take-off and the Tower Controller passed a surface wind check of 190°/15 kt.
- 1.1.3 After departure and whilst passing 1,500 ft. on the climb, the Captain indicated that he felt some pressurisation problem and made a decision to return back to Sharjah. The crew advised ATC of the technical problem at 0734 hrs and was cleared to join finals Runway 12. The Tower Controller enquired whether the crew required any assistance which the crew responded in the negative.
- 1.1.4 At 0736 hrs, AP-CAA was cleared to land Runway 12 and a surface wind check of 170°/10 kt was passed by the Tower Controller. The Captain indicated that he was not comfortable with the approach and he made a go around at 0737 hrs. After holding for about 9 mins on the LH downwind and to the north of the airfield due to traffic sequencing, at 0746 hrs the aircraft was cleared for a second approach and was told to report finals Runway 12.
- 1.1.5 At 0748 hrs, the crew reported finals and the aircraft was given clearance to land. The surface wind given by ATC at the time was 180°/12 kt. The Captain indicated that the LG was lowered in the holding area and noted 3 green lights were illuminated. According to the Captain, the approach was flown with a normal approach speed of between 110 to 120 kt and he noted that the crosswind was blowing from the right.
- 1.1.6 The aircraft touched down at about the 1000 ft marker on the RH MLG first and as it decelerated on the runway, the LH MLG started to collapse. According to the crew, the collapse was gradual with a subsequent dipping down of the LH wing. Just prior to this event, the Captain stated that he heard a noise as if something was broken. Both crew stated that this occurred between 1,500 ft to 2,000 ft after the aircraft had touched down.
- 1.1.7 The aircraft continued further along the runway and sensing that the LH propellers will strike the runway surface, the Captain feathered the LH engine. As he saw that the aircraft was about to depart the left side of the runway, the Captain feathered the RH engine propellers as well. The aircraft came to a complete stop just outside of the runway shoulder and about 6,600 ft beyond the runway threshold.
- 1.1.8 The crew exited the aircraft in the normal way and there were no injuries. There was also no fire. The airport RFF arrived at the scene within 1 min after the alarm was raised and upon spotting a fuel leak from under the damage LH wing tank, the fire crew applied foam under

the wing. The aircraft LH wing was damaged in the area of the collapsed MLG. The tips of the LH propeller blades were bent as the propellers struck the runway.

- 1.1.9 As a result of this runway excursion and the time taken for the Airport Authority in the careful recovery of the aircraft, the runway was closed to traffic from the time of the incident to 0856 hrs.

1.2 Injuries to persons

Injuries	Crew	Passengers	Total in Aircraft	Others
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	0	0	0	0
None	6	0	6	0
TOTAL	6	0	6	0

1.3 Damage to aircraft

All 3 propeller blades of the LH engine suffered tip bent damage. The aircraft also suffered dent, deformation and skin cut to its LH Wing and in the area of the collapsed MLG.

1.4 Other damage

One runway edge light was damaged when the aircraft departed the runway.

1.5 Personnel information

1.5.1 General.

The required flight crew complement for the Super King Air 200 is a Captain and a Co-Pilot. It was established that the Captain was occupying the LH seat and the Co-Pilot was at the RH seat controls at the start of the take-off leading up to the occurrence. All crew members held the required licences, experience and training specific to their appointment.

- 1.5.2 Captain : Pakistani National
: male, 51 years old
- Licence : Valid ATP Licence No. 871
: BE 200 Command type rating
- Medical Certificate : Class 1 valid until End April 2007
- Flying experience : Total all types - 7,000 hrs
: Total on BE 200 - 6,500 hrs
: Last 24 hours - 3 hrs 45 min

- 1.5.3 Co-Pilot : Pakistani National
: male, 47 years old
- Licence : Valid CPL No. 2674
: BE 200 Co-pilot type rating
- Medical Certificate : Class 1 valid until End March 2007
- Flying experience : Total all types - 4,465 hrs
: Total on BE 200 - 255 hrs
: Last 24 hours - 3 hrs 45 min
- 1.5.4 Ground Engineer : Pakistani National
: male, 38 years old
- Licence : AMEL No. 1820 valid to 25th January 2008
: BE 200 Category 'X' rating (Electrical)

1.6 Aircraft information

1.6.1 General Information.

The aircraft general information is as follows:

- Certificate of Registration : Registered in Pakistan as AP-CAA
Certificate of Airworthiness : Issued 12th August 06 and valid to 11th August 07
Registered Owner : Pakistan CAA
Registered Operator : Pakistan CAA
Aircraft Manufacturer : HBC
Type : Super King Air 200
Serial No. : BB-278
Total airframe hours : 10157:50 hours
Total cycles : 6319 cycles

1.6.2 Maintenance Details.

Maintenance performed on the aircraft was in accordance with the manufacturer's maintenance schedule for the Beechcraft Super King Air 200 aircraft.

1.6.3 LG System Description

An electrically operated, retractable LG is employed on this aircraft. A 28-volt split-field motor, located on the forward side of the centre-section main spar, extends and retracts the LG. The landing gear motor is controlled by the switch on the pilot's right sub-panel. The motor incorporates a dynamic braking system which helps prevent over travel of the LG.

Torque shafts drive the MLG actuators and duplex chains drive the NLG actuator. The LG shock struts are of the air-oil type and filled with compressed air and hydraulic

fluid. A safety switch on the right main gear torque knee opens the control circuit when the strut is compressed. The safety switch also actuates a solenoid operated down-lock hook on the LG control switch.

The hook automatically unlocks when the aircraft leaves the ground and can be manually overridden by pressing down on the red down-lock release button just left of the LG control switch handle.

Visual indication of LG position is provided by individual green indicator lights arranged in a triangle on the pilot's right sub-panel. Two red, parallel-wired indicator lights located in the control handle illuminate to show that the gear is in transit or not locked. They also illuminate when the landing gear warning horn is actuated.

1.6.4 LG Maintenance History.

The aircraft LG was overhauled on 15th February 2006 by PIAC and installed on the aircraft on 16th March 2006. The LG hours and cycles were then reset to '0'. The aircraft was released for test flight on 19th March 2006 and the result of the test flight was satisfactory.

The first LG defect reported by the pilot was on 23rd March 2006 after the newly overhauled LG completed 24 hrs 30 min of flight time and 13 cycles. The defect reported was "abnormal noise observed while extending the LG". The engineering unit of the CAA carried out the defect rectification and logged "NLG chain lubricated and retraction check found OK".

The second LG defect was reported on 21st November 2006 after completing 329 hrs 40 min and 200 cycles. The report indicated was "up-lock lights intermittent". The rectification done was "RH up-lock switch adjusted retraction test carried out and up-lock indication found OK".

The last inspection on the aircraft LG was carried out during the aircraft 2nd 150 hrs interval inspection on 24th November 2006, 2 days before the incident.

1.6.5 Operational details.

The details for this flight from Sharjah to RAK were as follows;

Empty Weight of Aircraft	-	8,229 lb
Fuel	-	1,600 lb
Crew Weight	-	1,020 lb
Payload	-	456 lb
Take-off Weight	-	11,305 lb (Max 12,500 lb)

1.7 Meteorological information

The surface weather observations at Sharjah International Airport for a period prior to and following the incident were generally as per the meteorological report as given below:

	0730 hrs	0800 hrs
Wind	: 190°/12 kt	170°/10 kt
Visibility	: 8000 m	8000 m
Cloud	: FEW at FL140	Sky Clear
Temperature	: 28°C/14°C	29°C/13°C
QNH	: 1014	1013
Warnings	: No Significant	No Significant

1.8 Aids to navigation

1.8.1 Navigation Aids.

The navigation aids for Runway 12 at Sharjah are VOR DME as well as an ILS. They conform to, and are operated in compliance with, Annex 10, Volume 1, Radio Navigation Aids. There was no known unserviceability or abnormality of the navigation aids prior to the incident.

1.9 Communications

All transmissions to the aircraft, as well as inter-agency telephone conversations, made by ATC were clear, in the English language, and recorded. Transcripts were made of all communications involving AP-CAA and attached at Appendix 1.

The UTC timing on the tapes was determined to be UTC time + 13 sec.

1.10 Aerodrome information

1.10.1 Aerodrome

Sharjah International Airport is a UAE international airport with full facilities based on ICAO Annex 14, Volume 1 physical specifications. Runway 12 is aligned at 121° M and dimensions are 4060 m x 45 m with a LDA of 3850 m.

1.10.2 Air Traffic Control.

At the time of the incident the Control Tower at Sharjah International Airport was manned by correctly licensed and validated personnel.

1.10.3 Fire Services

Sharjah Airport Fire Services are categorised as RFF Category 9. The RFF facility was determined to be operating to RFF Category 9 at the time of the incident.

1.11 Flight recorders

There were no flight recorders on board the aircraft nor were they required.

1.12 Wreckage and impact information

The aircraft departed the left side of the runway veering further left, and coming to a stop on a Northerly HDG about 6,600 ft from the threshold. The LH MLG collapsed into its wheel well with some sections of the LH Wing including the LH propellers touching the surface of the gravel strip where the aircraft came to a halt.

1.13 Medical and pathological information

1.13.1 Investigation of the flight crew members' medical history confirmed that they met the CAA and ICAO Annex 1 medical standards for the licences held.

1.13.2 The results of a drug and alcohol screening examination conducted shortly after the crew had disembarked detected neither drugs nor alcohol in either pilot's system.

1.13.3 There was no evidence that physiological factors or incapacitation affected the performance of flight crew members.

1.14 Fire

There was no fire.

1.15 Survival aspects

The incident was survivable. The crew had no difficulty in opening the entry/exit door and all crewmembers exited the aircraft through the door.

1.16 Crew Statements

A post incident interview with the flight crew was conducted on the following day of the incident.

Both crew stated that after departure passing 1,500 ft, there was a problem with the aircraft pressurisation system and the Captain decided to return back to Sharjah. During the first approach, the Captain stated that he did a go-around as he was not comfortable with the approach. During the landing from the second approach, the Captain stated that the aircraft touched down at about the 1000 ft marker on the centreline.

As the crosswind was from the right, the Captain stated that he elected to touch down on the RH MLG followed by the LH MLG with the aircraft almost straight on the centreline. After landing at about 1,500 ft, the Captain said he heard a noise as if something was broken and at the same time, he saw the LH wing going down. The Captain then feathered the LH engine propellers and as he saw the aircraft was departing the runway, he feathered the RH engine propellers as well.

He added that when the LG was lowered down, the 3 green lights were illuminated.

The Co-Pilot stated that the normal LG cycles for a flight conducting an ILS calibration are between 8 to 10 times.

The Ground Engineer confirmed that prior to the flight he checked the LG extensions and tyre pressure which was satisfactory. He added that there were also no hydraulic leaks visible.

1.17 Tests and research

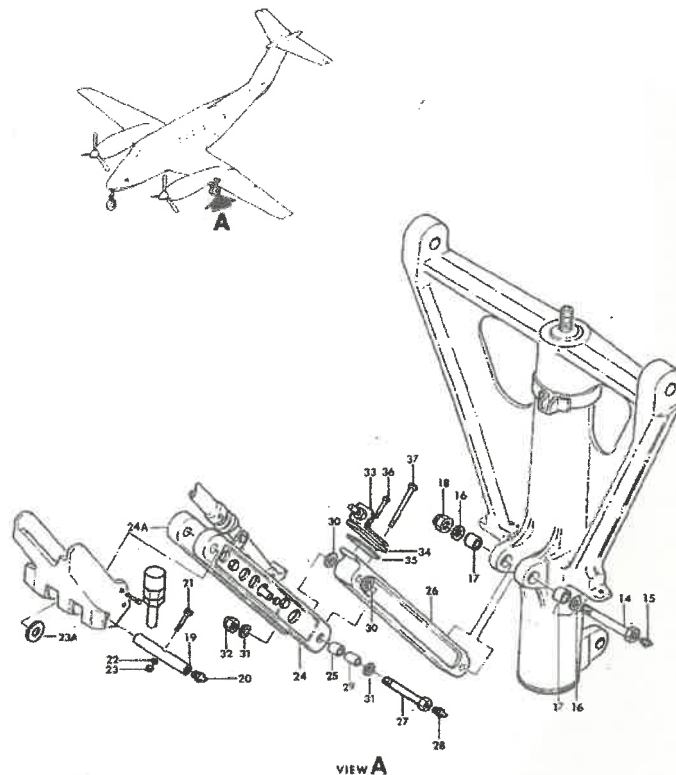
1.17.1 LH MLG Inspection by HBC.

The following parts from the LH MLG assembly installed on AP-CAA were removed and sent to HBC for inspection and analysis:

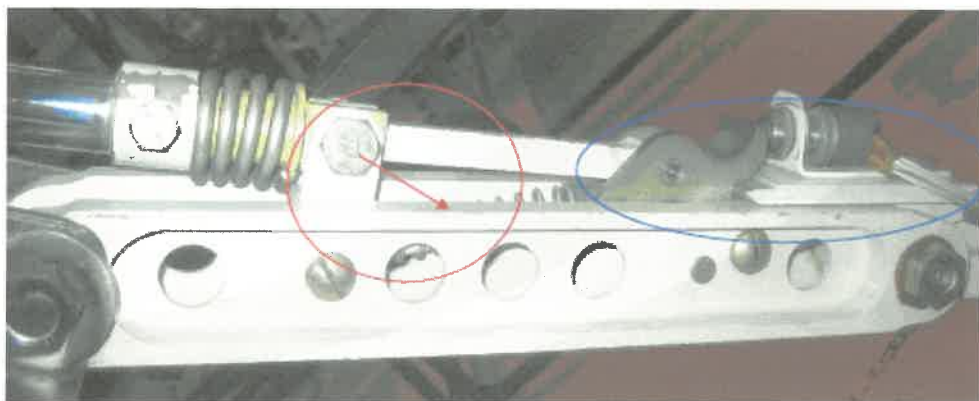
Item #	Part #	Description
24	50-810337-9	Drag Leg Assembly, Upper LH
24A	50-810337-10	Drag Leg Assembly, Upper RH
26	50-810336	Drag Leg, Lower
27	99-810067-3	Bolt
38	50-810338-5	Hook, Down Lock
39	AN26-34	Bolt
43	50-810353	Guide, Spring
47	50-810396-1	Link
50	99-810045	Link
93	99-810057-9	Actuator, Assembly, LH Main Landing Gear

Note: Item 38 and 43 was not received by HBC

1.17.2 MLG Installation on the Super King Air 200



1.17.3 Example of an assembled LG drag brace in a down and locked position.



Link bolt arc (red circle/arrow), upper hook and down-lock plate (blue circle)

HBC has examined other landing gear components that were subjected to the forces of a landing gear collapse. Witness marks on those gears were similar and reveal the following occurred when the landing gear drag brace was not rigged to on-center to over-center:

- The extended actuator nut will separate
- The link (50) will be driven forward and the bolt attaching the actuator nut will contact the upper drag brace interior sides (24a)
- The link (47) will be wrapped around the bolt attaching the actuator nut
- One end of the guide (43) (the black end attached to the downlock hook) will be bent and separated from the downlock hook
- The lower drag brace (24) will fold, bending the downlock plate in a downward arc, if the downlock hook was engaging the downlock hook mouth. Note: If the downlock plate was not engaging the downlock hook mouth when the lower drag brace (24) folds, the downlock plate will not be bent.
- When the lower drag brace folds, it will swing around onto the lower side of the upper drag brace and contact/separate the lower arm of the downlock hook.

1.17.4 The following is a view of the actuator nut, link, guide, and link rod re-assembled. Note the witness marks pointed out and the separated lower arm of the downlock hook.



Marks on Brace from link bolt, link curl Marks on lower brace from hook/hook bolt

1.17.5 The following is a view of the actuator and the separated actuator nut spread-out:



The actuator nut separations were viewed under magnification by HBC. No evidence of fatigue on the fractured surfaces was found.

1.17.6 Close examination of the inboard actuator support revealed the following:



Ball bearing marks on actuator support surface.



Marks showing inner bearing movement.

1.17.7 Close examination of the bearing race on the inboard actuator support.

1.17.7.1 The separated bearing race on the inboard actuator support was removed and viewed under magnification by HBC. Evidence of fatigue cracking was present on the two separated ends of the bearing race. The following photographs were taken of the bearing race ends:



Inner race end A



Inner race end B

1.18 Organisational and management information**1.18.1 Operator**

1.18.1.1 Dispatch. All necessary pre-flight information was available to the crew.

1.18.1.2 Operational Documentation. A review was conducted of the documentation and communication aspects. All manuals and documentation sighted by the Investigation Team were in good order and met the CAA requirements. The weight and balance confirmed that the Take-Off Weight of 11,305 lb was correct.

1.18.1.3 Maintenance Documents. All maintenance documents indicated that the maintenance had been conducted in accordance with the CAA approved maintenance schedule. All maintenance documents were found to be in order.

1.18.2 Regulatory Authority. In respect to regulatory oversight all documentation was in order and there was a demonstrated and adequate regulatory oversight in continuing airworthiness and flight operations by the CAA.

1.19 Additional information

1.19.1 The CAA approved Daily Inspection checks for the aircraft LG covers the following:

MLG and NLG

7. Check main and nose wheels, tyres for wear cuts, creep against slip marks and for correct pressure, MLG 65 PSI – NLG 55-60 PSI.

8. Check main and nose oleo strut for condition and proper inflation, MLG 5.56” to 5.93”, NLG 3.5”

9. Check brake assemblies and lines for leakage, condition and wear within approved limits, maximum wear 0.250” (with parking brakes on)

10. Check MLG and NLG door for condition and security

11. Check area in the main and nose wheel well for condition security and damage

1.19.2 Super King Air 200 Series 2nd 150 hr Interval Detailed Inspection for LG

Part A – Operational Inspection

36. MLG – Check MLG wheel wells for leaks, security of components and general condition.

37. Tyres – Check tyres for condition and inflation.

- 38. NLG - Check NLG wheel well for leaks, security of components and general condition.
- 39. ...
- 40. ...
- 41. LG Strut – Inspect shock struts and components for condition attachments, proper inflation and leakage. Deflate and check fluid level if sign of leakage are apparent.

1.20 Useful or effective investigation techniques

Nil

2. ANALYSIS

2.1 General

During the landing roll at Sharjah International Airport, the aircraft LH MLG collapsed. When the LG was selected down prior to the landing, the crew confirmed that they had 3 green lights illuminated which indicated that the LG were down and locked. The Captain also noted that since the crosswinds were from the right, he therefore elected to touch down on the RH MLG first rather than on both MLG. Both crew testified that the landing was normal and not a hard one. This analysis will therefore examine the reasons for the collapse of the LH MLG despite the foregoing conditions and considers other operational and engineering aspects.

2.2 Examination of the LG Components

The results of the component examination conducted by HBC suggested the landing gear collapsed when the landing gear actuator nut was about full extension. The loss of the inner race would cause the actuator to loose extension and retraction rigging alignment, and, as a consequence, the drag brace rigging would be lost. The loss of the bearing support (rigging alignment) had occurred an unknown time before the incident flight. The actuator inboard support surface gouging from bearing balls and the inner race movement suggested multiple landing gear extension and retractions had occurred since the loss of the bearing support. An out of rig actuator may not be capable of commanding the landing gear to a down-and-locked position and the drag brace to an on-center to over-center position.

2.3 LG Maintenance and Inspection

The existing inspection programme for the LG system does not in any way allow for the detection of the fatigue cracking on the bearing race ends and loss of rigging alignment of the LG actuator.

2.4 Nature of Flight Calibration Operations

The aircraft is being used extensively for flight calibration operations. The nature of the operation requires the LG to be cycled several times during flight. During a typical calibration flight for the inspection of an ILS system for example, the LG is extended and retracted between 8 to 10 times.

It is envisaged that these number of cycles of the LG in flight will subject the LG to additional stress that may contribute to the fatigue and loss of rigging alignment of the LG system. Therefore, it is important for the pilot to record the exact number of times the LG is cycled to enable any monitoring of fatigue and loss of rigging of the LG.

2.5 Organisation Factors

A review of the organisation's documentation, procedures, training and regulatory oversight determined that the crew had the necessary training, experience and information to conduct this flight safely. There was also no evidence to suggest that the

company's maintenance policy of the LG may have been a factor to the cause of this incident.

2.6 Weather.

The prevailing weather conditions at Sharjah International Airport on the day of the incident were not considered a factor to this serious incident.

2.7 Aircraft Serviceability.

The aircraft was correctly certified and maintained in accordance with the manufacturer's requirements. The aircraft documentation indicated that all required maintenance had been conducted in accordance with the CAA approved maintenance schedule. From the aircraft documentation the aircraft was considered fully serviceable for the flight.

2.8 Communications.

From the ATC voice tapes, it was determined that the instruction from ATC was given clearly without any external interference. ATC was not a factor in this incident.

2.9 Human Factors Consideration.

2.9.1 Captain's decision making.

Based on the existing surface wind conditions on the day of the incident, it would have been natural for the Captain to elect to touch down on the RH MLG first so as to counter the crosswind which was blowing from the right. At the approximate time of the landing, there were crosswinds of 10 to 15 kt.

Given the hindsight knowledge of the probable cause of the collapsed LH MLG, if the aircraft was to touch down on both MLG simultaneously, the LG may have collapsed earlier and at a higher speed during the landing roll. This would probably lead to a higher severity of the runway excursion and damage to the aircraft.

Therefore, the Investigation Team concludes that the Captain's decision to touch down on the RH MLG first was appropriate.

2.10 Summary

Given the circumstances that led to the collapse of the LH MLG, there was no way the fatigue of the bearing race ends and out of rig alignment of the LG actuator inboard support could be detected. However, the professionalism displayed by the flight crew, in particular the Captain, reduced the severity of the incident and subsequent damage to the aircraft.

3. CONCLUSIONS

3.1 Findings

- (a) The operator was correctly authorised by the Pakistani CAA to operate the Beechcraft Super King Air 200 aircraft for flight calibration operations.
- (b) The aircraft was correctly registered, insured, and held a valid Certificate of Airworthiness.
- (c) The aircraft was serviceable on start-up at Sharjah International Airport with no known mechanical defects.
- (d) The flight crew and ground engineer were correctly licensed, rated, and qualified in accordance with the CAA applicable regulations and requirements for the Super King Air 200 aircraft.
- (e) Each crew member held a valid and appropriate medical certificate and neither suffered from a known medical condition or injury.
- (f) All required information for the safe conduct of flights and the maintenance of Super King Air 200 aircraft was current and available.
- (g) The aircraft was correctly loaded and its documentation in order.
- (h) The weather was not a factor in the incident.
- (i) The CAA safety oversight of the operator's procedures and operations was adequate.
- (j) The Captain's decision to touch down on the RH MLG first due to crosswinds was appropriate.
- (k) The earlier defects reported on the newly overhauled LG did not have a bearing on the cause of the incident.
- (l) Evidence of fatigue cracking was present on the ends of the bearing race.
- (m) The loss of the bearing support (rigging alignment) had occurred an unknown time before the incident flight.
- (n) The actuator inboard support had surface gouging from bearing balls present.
- (o) The surface gouging and inner race movement suggested that multiple landing gear extensions and retractions have occurred since the loss of the bearing support.
- (p) The LH MLG actuator was out of rig alignment.

- (q) The nature of operations required the LG to be extended and retracted several times during each calibration flight.
- (r) The frequent extension and retraction of the LG may have contributed to fatigue cracking of the bearing race.
- (s) The crosswinds were within the aircraft capabilities and did not adversely affect the flight crew ability to manoeuvre the aircraft during the approach and landing.
- (t) The airport RFF response to the incident was timely and appropriate. The crewmembers safely exited the aircraft.

3.2 Cause

The probable cause of the incident was the loss of rigging alignment of the LH MLG actuator which resulted in the collapsed of the LG. The out of rig actuator of the LH MLG was caused by: 1) fatigued cracking of the ends of the bearing race 2) This loss of the bearing race would cause the actuator to loose extension and retraction rigging alignment, and consequently, the drag brace rigging would be lost.

4. RECOMMENDATIONS

The U.A.E. GCAA recommends that the Pakistani CAA:

- 4.1 Note the circumstances of the serious incident and to publicise the contents of the Investigation Report to all its operators operating similar type of aircraft.
- 4.2 Require the operator to add a specific requirement for all pilots to record the exact number of times the LG is cycled during flights so as to administer the timeliness of fatigue and loss of rigging monitoring of the aircraft LG system and components.
- 4.3 Identify an appropriate inspection interval for the checking of fatigue and loss of rigging alignment on the LG installed on the aircraft and require the operator to comply with this inspection interval and to report to the manufacturer if signs of fatigue and loss of rigging alignment are discovered.

This Investigation Report has been adopted by the following GCAA Investigation Team Members:

Original Signed

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