



EXECUTIVE SUMMARY AND SERIOUS AIRCRAFT INCIDENT REPORT

				Reference:	CA18/3/2/0648	
Aircraft Registration	ZS-OAF	Date of Incident	03 May 2008		Time of Accident	0804Z
Type of Aircraft	BOEING B737-453		Type of Operation		Domestic Scheduled Flight	
Pilot-in-command Licence Type		ATP	Age	44	Licence Valid	Yes
Pilot-in-command Flying Experience		Total Flying Hours	11434.9		Hours on Type	1109.7
Last point of departure		Cape Town International Airport (FACT)				
Next point of intended landing		Port Elizabeth Airport (FAPE)				
Location of the incident site with reference to easily defined geographical points (GPS readings if possible)						
During take-off from Runway 19 at Cape Town International Airport.						
Meteorological Information		The weather was fine; Temperature:14°C Wind: Southerly/light.				
Number of people on board	2 + 4 + 143	No. of people injured	0	No. of people killed	0	
Synopsis						
<p>On 03 May 2008, the Boeing B737- 453 was scheduled to fly on a scheduled domestic flight from Cape Town International Airport to Port Elizabeth Airport.</p> <p>At approximately 0800Z, the aircraft taxied to the threshold of Runway 19 at Cape Town International for the take-off. The Captain, who was the pilot flying (PF) stated that 5° of flaps was selected and the required take-off thrust set for take-off. The Captain further stated that the aircraft felt nose-heavy and slower than normal in response to the elevator input. As the aircraft was rotated, a bump was felt which raised a suspicion with the cockpit crew that a tail strike may have occurred. The landing gears were retracted and the crew advised the ATC of the possible tail-strike incident. The cockpit crew then briefed the cabin crew and passengers accordingly and the cabin was secured for landing. After a runway inspection was carried out by the Fire Department, the aircraft was cleared for a landing. The cockpit crew then noted that the bugs on the Captain and Co-pilot Air Speed Indicators (ASI) were set the same but lower than the take-off card speeds. The aircraft landed normally without any further event.</p> <p>There were no injuries sustained, neither was structural damage sustained to the aircraft.</p>						
Probable Cause						
Low speed during rotation as a result of incorrect Air Speed Indicator (ASI) settings by the crew.						
Contributory Factor:						
Interruption in the electrical power supplied by the Ground Power Unit (GPU) whilst the crew were busy with the pre-take-off checks in the cockpit.						
IARC Date				Release Date		



AIRCRAFT SERIOUS INCIDENT REPORT

Name of Owner/Operator : Comair Limited
Manufacturer : Boeing Aircraft Company
Model : B737- 453
Nationality : South African
Registration Marks : ZS-OAF
Place : Cape Town International Airport
Date : 03 May 2008
Time : 0804Z

All times given in this report are Co-ordinated Universal Time (UTC) and will be denoted by (Z). South African Standard Time is UTC plus 2 hours.

Purpose of the Investigation :

*In terms of Regulation 12.03.1 of the Civil Aviation Regulations (1997) this report was compiled in the interests of the promotion of aviation safety and the reduction of the risk of aviation accidents or incidents and **not to establish legal liability**.*

Disclaimer:

This report is given without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of Flight

- 1.1.1 On 03 May 2008, the Boeing B737-453 was scheduled to fly on a domestic flight from Cape Town International Airport to Port Elizabeth Airport. Whilst the cockpit crew were busy with the pre-flight inspection, there were some interruptions when the Ground Power Unit (GPU) that supplies electrical power to the aircraft, suddenly shut down. The Auxiliary Power Unit (APU) which is fitted to the aircraft supplies electrical power, air pressure to the aircraft air conditioning system and pressurization system including to the engine start system, which was inoperative at the time.
- 1.1.2 At approximately 0800Z, the aircraft taxied to the threshold of Runway 19 at Cape Town International for the take-off. The Captain who was the pilot flying (PF) stated that 5° of flaps was selected with the required take-off thrust set for take-off,, but the aircraft felt nose-heavy and slower than normal in response to the elevator input. The aircraft was rotated during the ground roll according to the bugs set on both the Captain and Co-pilot Air Speed Indicators (ASI). As the aircraft was rotated, a bump was felt which raised a suspicion with the cockpit crew that a tail-strike may have occurred. The landing gear was retracted and the cockpit crew advised the ATC of the possible tail strike incident. The cockpit crew then briefed the cabin crew and passengers accordingly and the cabin was secured for landing. After a runway inspection was carried out by the Fire Department, the aircraft was cleared for a landing. The cockpit crew then noted that the bugs on the Captain and Co-pilot Air Speed Indicators (ASI) were set the same but lower than the take-

off card speeds. The cockpit crew then configured the aircraft and landed normally with 30° of flaps without any further event.

1.2 Injuries to Persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	-	-	-	-
Minor	-	-	-	-
None	2	4	143	-

1.3 Damage to Aircraft

1.3.1 The aircraft sustained no structural damage. The tail skid cartridge was found partially compressed; there were scrape marks on the skid shoe casting and the associated fairing was damaged.

1.4 Other Damage

1.4.1 There was no other damage.

1.5 Personnel Information

1.5.1 Captain (Pilot-in-Command):

Nationality	South African	Gender	Male	Age	44
Licence Number	*****	Licence Type	ATP		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instrument & night rating, Instructor Grade 2, Tug & Safety pilot.				
Medical Expiry Date	05 December 2008				
Restrictions	None				
Previous Accidents	None				

Flying Experience :

Total Hours	11434.9
Total Past 90 Days	147.1
Total on Type Past 90 Days	56.0
Total on Type	1109.7

1.5.2 Co-Pilot:

Nationality	South African	Gender	Male	Age	36
Licence Number	*****	Licence Type	ATP		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	Instruments, Instructor Grade 2				
Medical Expiry Date	31 October 2008				
Restrictions	None				
Previous Accidents	None				

Flying Experience :

Total Hours	5920.8
Total Past 90 Days	53.2
Total on Type Past 90 Days	53.2
Total on Type	373.9

1.6 Aircraft Information

Airframe :

Type	Boeing B737-453	
Serial Number	25116	
Manufacturer	Boeing Aircraft Company	
Date of Manufacture	1991	
Aircraft Status	Type Certified	
Total Airframe Hours (At time of Accident)	43160.5	
Last Check A Inspection (Hours & Date)	43069.24	22 April 2008
Hours since Last Check A Inspection	91.26	
C of A (Issue Date)	4 April 2007	
C of R (Issue Date) (Present owner)	06 March 2007	
Operating Categories	Standard	

No. 1 (Left-hand Engine) :

Type	CFM International
Serial Number	PP727112
Hours since New	37699.47
Hours since Overhaul	Not reached

No. 2 (Right-hand Engine):

Type	CFM International
Serial Number	PP857662
Hours since New	26233.17
Hours since Overhaul	Not reached

1.6.1 Mass and Balance

According to the BA-Comair Flight Operations Department, the Mass and Balance for take-off and landing were as follows:

Zero Fuel Weight	48325 kg
Take-off Fuel Weight	7400 kg
Actual Take-off Weight	55725 kg
Trip Fuel (Burn-off)	-1010 kg
Actual Landing Weight	54715 kg
Maximum Allowable Take-off Weight (MTOW)	64636 kg

The calculated actual take-off weight for the aircraft was 55725 kg, which showed that the aircraft was 8911 kg below the maximum take-off weight of 64636 kg. The aircraft landed with a landing weight of 54715 kg after the aircraft burned off 1010 kg of fuel after take-off, which showed that the aircraft landed with a landing weight which was 3069 kg below the maximum landing weight for the aircraft.

1.7 Meteorological Information

1.7.1 According to the pilot's questionnaire, the weather was fine at the time of the incident with the wind southerly but light. The surface temperature was 14°C with overcast cloud conditions prevailing.

1.7.1 The following weather information was obtained from the pilot's questionnaire:

Wind direction	Southerly	Wind speed	5 knots	Visibility	> 10km
Temperature	14°C	Cloud cover	3/8	Cloud base	3000ft
Dew point	Unknown				

1.8 Aids to Navigation

1.8.1 The aircraft was equipped with a VHF Transmitter & HF Transmitter, Emergency Transmitter and Weather Radar, ADF, ILS, TCAS, VOR, GPS, and DME that was serviceable at the time of the incident.

1.9 Communications

1.9.1 The crew communicated on VHF frequency 118.1 MHz with FACT ATC. After take-off, the cockpit crew reported to the ATC that they might have scraped the tail on take-off and would like to return to Cape Town Airport. Annexure 'A' ATC transcript is attached to the report.

1.10 Aerodrome Information

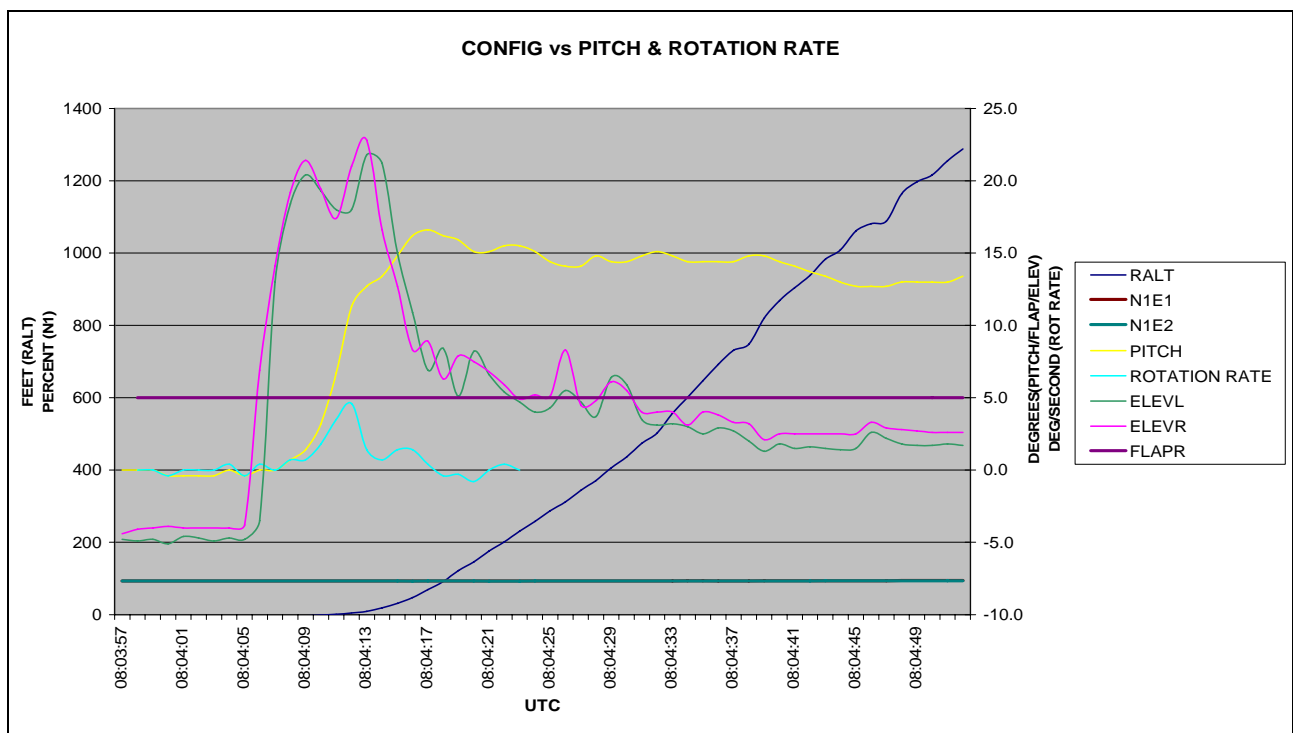
Aerodrome Location	Cape Town International Airport 7nm SE from Cape Town	
Aerodrome Co-ordinates	S33° 58.1' E018°36.3'	
Aerodrome Elevation	151ft	
Runway Designations	01/19	16/34
Runway Dimensions	3201 x 61m	1701 x 46m
Runway Used	Runway 19	
Runway Surface	Asphalt	
Aerodrome Status	Licensed	
Approach Facilities	ILS LLZ CAT I NDB VOR UHF DME; ILS GP;	

1.11 Flight Recorders.

1.11.1 The aircraft was equipped with a flight data recorder (FDR) and a cockpit voice recorder (CVR). The FDR was downloaded at South African Airways Avionics Section.

- The Heading & Radio Altitude versus Distance from the runway threshold shows the aircraft rotated 1850 metres from the threshold of Runway 19 and at the point of rotation. Annexure 'B' is attached to the report.
- The Radio Altitude versus Pitch & Rotation Rate. Annexure 'C' is attached to the report.

FIGURE 1: CONFIGURATION VERSUS PITCH & ROTATION RATE



- The yellow line on the above graph shows the aircraft pitch of 11.3° when the aircraft became airborne. The red & light green line shows the elevator left & right indication of approximately 20° during the take-off run.
- The dark green horizontal line on the graph shows No. 1 & 2 Engines N1 engine speed at approximately 93.5%. The purple horizontal line shows the flaps extended to 5° during take-off.

1.11.2 The CVR (Cockpit Voice Recorder) was downloaded at the SAA Avionics Section but found over-written with no available information, due to the fact that the circuit breaker was not pulled after the incident had occurred.

1.12 Wreckage and Impact Information

1.12.1 During the take-off roll from Runway 19 at FACT, the aircraft rotated approximately 1850 metres from the threshold of Runway 19, when the tail strike incident occurred. The aircraft continued with the take-off and returned for landing back on Runway 19 at FACT.

1.12.2 The tail-skid cartridge was found partially compressed with scrape marks on the tail-skid and associated fairing. The tail-skid shoe separated from the tail skid and was located off the runway on the grass.

1.13 Medical and Pathological Information

1.13.1 The cockpit crew, cabin crew and passengers were not injured during the incident.

1.14 Fire

1.14.1 There was no evidence of a pre- or post-impact fire.

1.15 Survival Aspects

1.15.1 The accident is considered survivable as the crew and passengers were properly restrained and there was no damage to the cockpit or cabin area.

1.16 Tests and Research

1.16.1 The FDR (flight data recorder) was downloaded at the South African Avionic Section with the relevant data & graphs available. Annexure 'B' and 'C' are attached to the Incident Report.

1.16.2 The CVR (cockpit voice recorder) was downloaded but no available information was available, as the circuit breaker was not pulled and the tape was over-written during the flight prior to landing.

1.16.3 According to available information, the cockpit crew were busy with the pre-flight checks in the cockpit, which also includes setting up the bugs on the Air Speed Indicators, when there were interruptions when the Ground Power Unit (GPU) that supplies electrical power to the aircraft, suddenly shut down. As the Auxiliary Power Unit (APU) that supplies electrical power and air pressure to the aircraft's air conditioning system was also inoperative at the time, the cockpit crew's workload increased with a disturbance in their pre-flight procedures.

1.17 Organisational and Management Information

1.17.1 The aircraft was being operated by Comair Limited on a Scheduled Domestic flight and according to South African Aviation Authority Civil Aviation Regulations, 1997, the operator was in possession of a valid Air Operating Certificate CAA/S066D with the expiry date being 28 April 2009.

1.17.2 The Aircraft Maintenance Organisation (AMO 006) was last audited by the SA:CAA Airworthiness Department in 2007 and no major deficiencies were found. The AMO was in possession of a valid approval, certificated at the time of the incident.

1.18 Additional Information

1.18.1 None.

1.19 Useful or Effective Investigation Techniques

1.19.1 None.

2. ANALYSIS

2.1 On 03 May 2008, the Boeing B737-453 was bound to fly on a scheduled domestic flight from Cape Town International Airport to Port Elizabeth Airport. Whilst the cockpit crew were busy with the pre-flight inspection in the cockpit, there were some interruptions when the Ground Power Unit (GPU) that supplies electrical power to the aircraft, suddenly shut down. The Auxiliary Power Unit (APU) that is fitted to the aircraft that also supplies electrical power as well as air pressure to the aircraft's air conditioning system and pressurization system, including to the engine start system, was inoperative at the time.

2.2 The Captain was the pilot flying (PF) and during the take-off roll, the aircraft was slower than normal in response to elevator input. The aircraft was rotated during the ground roll according to the bugs set on both the Captain and Co-pilot Air Speed Indicators (ASI). As the aircraft was rotated, a tail strike occurred. The cockpit then noted that the bugs on the Captain and Co-pilot Air Speed Indicators (ASI) were set the same but lower than the take-off card speeds. The cockpit crew then advised the ATC of the tail strike incident and requested to turn back to Cape Town Airport. The cockpit crew configured for a 30° flap landing and landed normally without any further event.

- 2.3 As the cockpit crew were busy with the pre-flight inspection procedures which included setting the bugs on the Air Speed Indicators, they were interrupted and distracted during the procedures whilst busy with their tasks when the Ground Power Unit (GPU) that supplies electrical power to the aircraft, suddenly shut down. As a result, the crew failed to observe that the Air Speed Indicators were not set according to the take-off card speeds.

3. CONCLUSION

3.1 Findings

- 3.1.1 The pilot-in-command was the holder of a valid Airline Transport Pilot's licence with the aircraft type endorsed on his licence.
- 3.1.2 The co-pilot was also the holder of a valid Airline Transport Pilot's licence with the aircraft type endorsed on his licence.
- 3.1.3 The aircraft took off from FACT on a scheduled domestic flight to Port Elizabeth Airport when the incident (tail scrape) occurred.
- 3.1.4 Whilst the cockpit crew were busy with the pre-flight inspection and pre-take-off checks in the cockpit, there was an interruption when the ground power unit that supplies electrical power to the aircraft, suddenly shut down. It appears that the cockpit crew were distracted during the interruption and failed to observe that the ASI (Air Speed Indicator) bugs were not set according to the take-off card speeds. They only noticed the discrepancy after the tail strike incident had occurred.
- 3.1.5 The Aircraft Maintenance Organisation (AMO 006) was in possession of a valid AMO-approved certificate.
- 3.1.6 The Operator was the holder of a valid Air Operating Certificate at the time of the incident.
- 3.1.7 The aircraft sustained some damage in that the tail-skid cartridge was partially compressed with scrape marks on the skid and tail-skid fairing.
- 3.1.8 Fine weather prevailed at the time and did not contribute to the cause of the tail-scrape incident.
- 3.1.9 There were no injuries sustained to the flight crew or the passengers.

3.2 Probable Cause/s

- 3.2.1 Low speed during rotation as a result of incorrect Air Speed Indicator (ASI) settings by the crew.
- 3.2.2 Contributory Factor:
There was an interruption in the electrical power supplied by the Ground Power Unit (GPU) whilst the crew were busy with the pre-take-off checks in the cockpit.

4.1 **Safety Recommendations:**

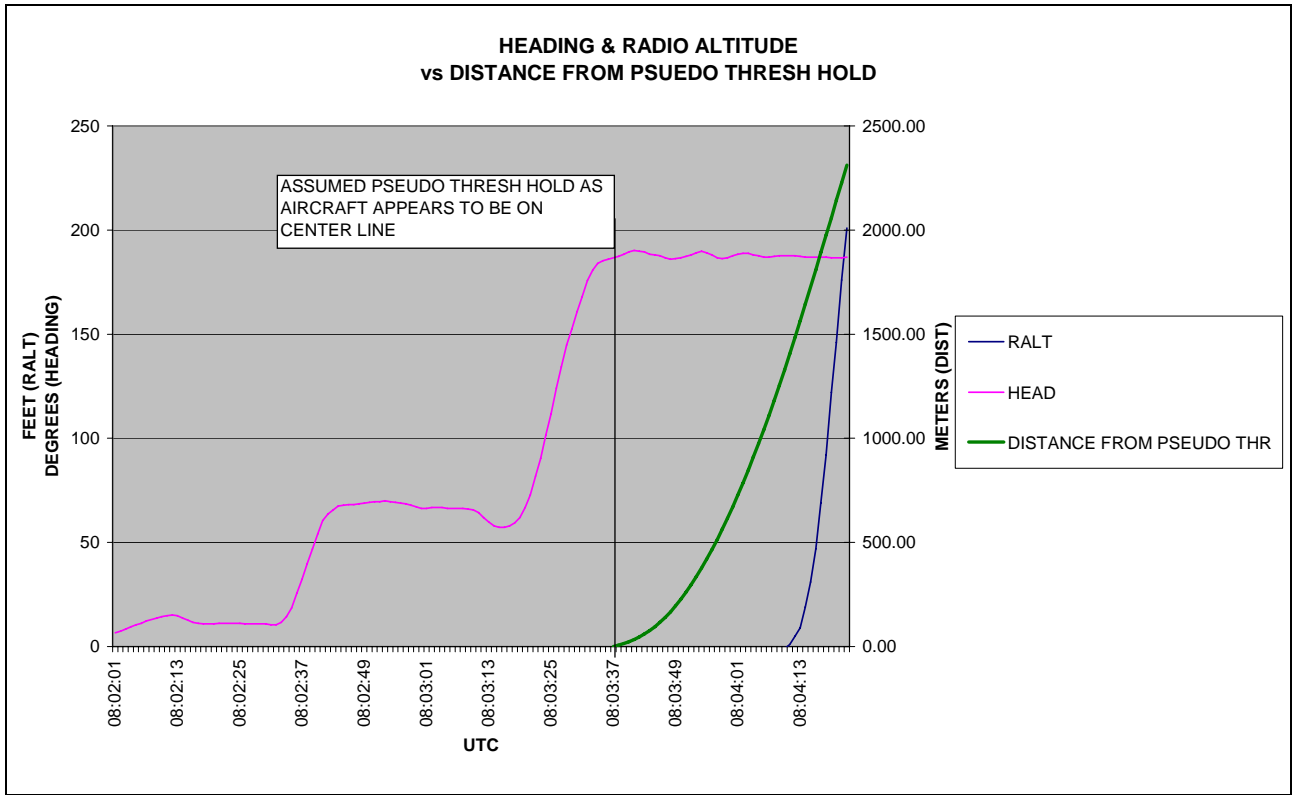
- 4.1.1 It is recommended that Comair Flight Training should brief crews during training and CRM (Crew Resource Management) courses, at all times to do full pre-flight checks and to ensure that all settings such as on the Air Speed Indicator bugs be independently re-checked whenever electrical and other disruptions occur during the cockpit pre-flight and take-off check procedures.
- 4.1.2 It is also recommended that Comair Flight Training should brief crews during training to pull the CVR circuit breaker whenever any abnormal condition occurs in order to preserve the information available on the CVR for further investigation.

-END-

Report reviewed and amended by the Advisory Safety Panel
24 February 2009

ANNEXURE 'A'

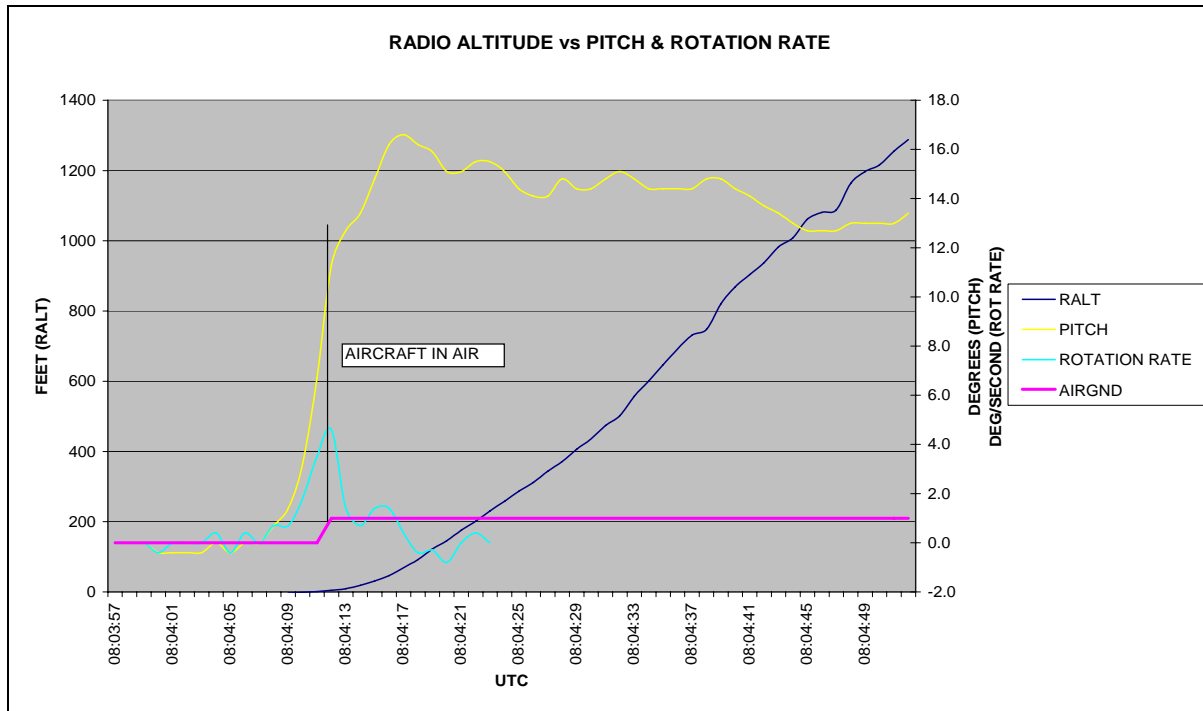
HEADING & RADIO ALTITUDE



- The red line on the graph shows the aircraft's heading during taxiing at 0802.01Z to the threshold of Runway 19 (heading 190°).
- The blue line shows the aircraft becoming airborne (air-mode) at approximately 0804:12Z (main & nose landing gear wheels off the runway during rotation)
- The green line shows the aircraft's distance of approximately 1850m from the threshold to rotation.

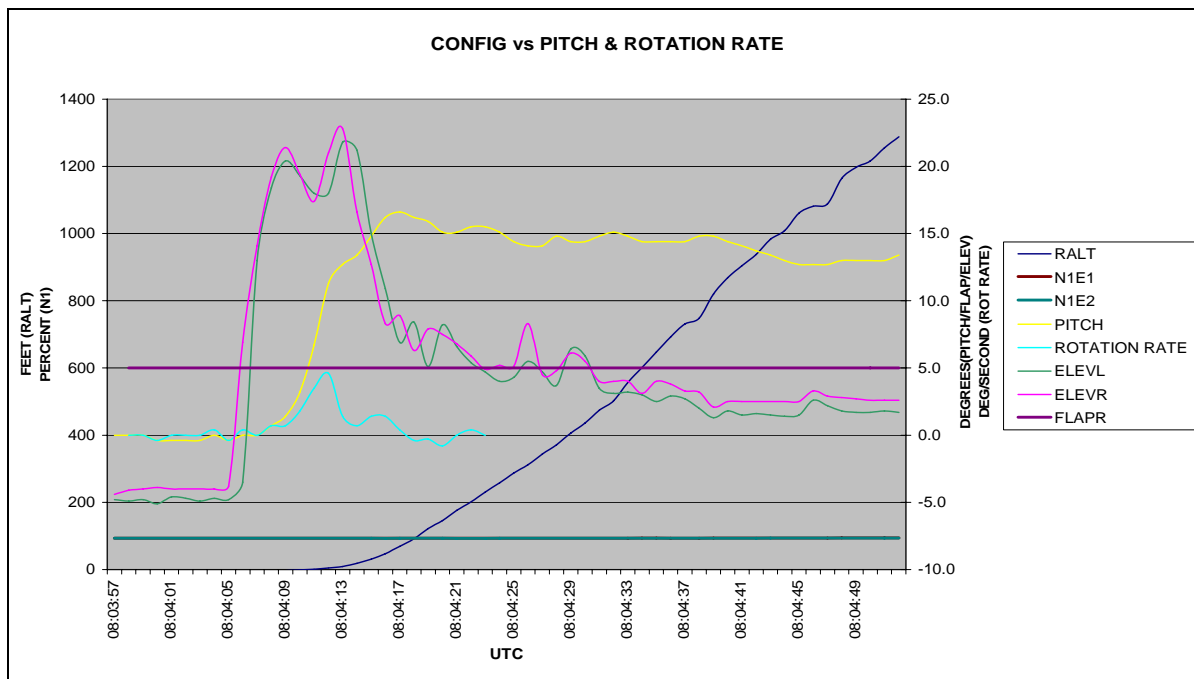
ANNEXURE 'C'

RADIO ALTITUDE VERSUS PITCH & ROTATION RATE



- The red line shows the aircraft during the take-off roll which became airborne at approximately 0804:13
- The yellow line shows the average degrees of pitch of approximately 4.6° before the aircraft became airborne at approximately 0804:13Z.
- The dark blue line shows the radio altitude (RALT) from 0 climbing through 1300ft.

CONFIGURATION VERSUS PITCH & ROTATION RATE



- The Graph shows the combined figures as shown in Figure 1 and 2 but also includes the dark green line which indicates No. 1 & 2 Engines N1 engine speed at approximately of 93.5 %. The horizontal purple line shows the flaps extended to 5° during take-off.

1.11.1 The following FDR (Flight Data Recorder) Data was downloaded at SAA Avionics:
Section:

RECORDED TABLE OF PARAMETERS DOWNLOADED FROM FDR:

TIME (Z)	R ALT	PITCH	CAS	G SPD	N1E1	N1E2
08:03:37	- 3	-0.4	45	13	56.63	58.75
08:03:41	- 3	-0.4	45	20	86.88	81.13
08:03:48	- 3	-0.4	46	51	93.38	93.13
08:03:53	- 3	0.0	71	75	93.38	93.50
08:03:57	- 3	0.0	87	93	93.50	93.38
08:04:05	- 3	-0.4	121	126	93.63	93.25
08:04:09	- 3	1.4	135	142	93.63	93.25
08:04:12	9	11.3 (Air)	144	152	93.25	93.13
08:04:21	176	15.1	156	163	93.38	93.00
08:04:29	406	14.4	167	169	93.63	93.25
08:04:33	557	14.8	171	172	93.63	93.25
08:04:37	731	14.4	174	177	93.50	93.38
08:04:41	748	14.8	174	177	93.45	93.33
08:04:45	1061	12.7	177	178	94.00	93.88