AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/9047		
Aircraft Registration	**ZS-HRZ**	**Date of Accident**	27 May 2012		**Time of Accident**	1321Z	
Type of Aircraft	Bell 206B (Helicopter)		**Type of Operation**		Private flight		
Pilot-in-command Licence Type	Private		**Age**	45	**Licence Valid**	Yes	
Pilot-in-command Flying Experience	Total Flying Hours		190,9		Hours on Type	21,4	
Last point of departure	Grand Central aerodrome (FAGC), (Gauteng province)						
Next point of intended landing	Grand Central aerodrome (FAGC), (Gauteng province)						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
Portland Park, Midrand (GPS position S 25°59'34.12 " E 028°7'37.08" at an elevation of 5 100 ft)							
Meteorological Information	Surface wind; light and variable, Temperature; 19℃ , Visibility; +10 km						
Number of people on board	1 + 1	**No. of people injured**	2		**No. of people killed**	0	
Synopsis							

On 27 May 2012 at approximately 1250Z, the pilot, accompanied by two passengers took off on a private flight, from Grand Central aerodrome to a private aerodrome near Rooiberg in the Limpopo province. While in hover flight, the pilot observed the "Low RPM" warning light illuminating on the annunciator panel whereupon he landed back. After one of the passengers and some of the baggage were offloaded he attempted a 2nd take-off.

During the 2nd take-off the pilot advised air traffic control (ATC) that he was having a power related problem and that he was going to fly one circuit. Once established on a left downwind for runway 35, the pilot advised ATC that he was experiencing a power loss and that he was going to return to the aerodrome. Shortly after this communication, the helicopter collided with a concrete fence of an office park next to a public road and crashed.

The helicopter sustained extensive damage during the impact sequence. The two occupants onboard both suffered from serious back injuries. The pilot was airlifted from the scene by air ambulance to a hospital in Johannesburg and the passenger was taken via road ambulance to hospital.

Probable Cause

The pilot allowed the main rotor RPM to decay and did not take any corrective action prior to impacting with a concrete wall.

Contributing factor(s):
Improper flight planning. (No weight and balance calculations prior to the flight)
Lack of decision making. (The pilot failed to perform a precautionary landing once he encountered a problem but instead continued with the flight).
Lack of familiarity with the helicopter type.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner	**:** Money Aviation (Pty) Ltd
Name of Operator	**:** Private flight
Manufacturer	**:** Bell Helicopter Textron
Model	**:** 206B
Nationality	**:** South Africa
Registration Marks	**:** ZS-HRZ
Place	**:** Portland Park, Midrand
Date	**:** 27 May 2012
Time	**:** 1321Z

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 interest 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 produced without prejudice to the rights of the CAA, which are reserved.

1. FACTUAL INFORMATION

1.1 History of flight

1.1.1 On 27 March 2012 at approximately 1250Z, the pilot, accompanied by two passengers, took-off on a private flight from Grand Central aerodrome to a private aerodrome near Rooiberg in the Limpopo province. While in hover flight, the pilot observed the "Low RPM" warning light illuminating on the annunciator panel. The warning light was accompanied by an audio warning that made a very distinct *"beep beep"* sound according to the left front seat passenger. The pilot then landed back.

It was then decided that the aft seat passenger as well as some of the baggage should be offloaded.

1.1.2 Several minutes later the pilot advised the Grand Central air traffic control (ATC) that he was having a power related problem with the helicopter and that he was going to fly one circuit to ascertain if there was indeed a problem with the helicopter. He was cleared for take-off by ATC at his own discretion, taxiway 35.

1.1.3 Once established on a left downwind for runway 35, the pilot advised ATC that he was experiencing a power loss and that he will be returning to the aerodrome.

1.1.4 Shortly after the pilot communicated with ATC, the helicopter collided with the concrete palisade fence of the Portland Park, in Midrand.

1.1.5 The helicopter sustained extensive damage during the impact sequence. The two occupants onboard both suffered from serious back injuries. The pilot was airlifted from the scene by air ambulance to a hospital in Johannesburg and the passenger was taken via road ambulance to hospital.

1.2 Injuries to persons

Injuries	Pilot	Crew	Pass.	Other
Fatal	-	-	-	-
Serious	1	-	1	-
Minor	-	-	-	-
None	-	-	-	-

1.3 Damage to aircraft

1.3.1 The helicopter was extensively damaged during the impact sequence.

Figure 1. A photo of the wreckage with the concrete wall visible in the back.

1.4 Other Damage

1.4.1 The concrete perimeter fence of the office park sustained damage when the helicopter collided with the fence. In addition, minor damage was caused to the surrounding vegetation in the immediate area of the impact point.

1.5 Personnel Information

Pilot-in-command

Nationality	South African	Gender	Male	Age	45
Licence number	0272301821	Licence type	Private		
Licence valid	Yes	Type endorsed	Yes		
Ratings	None				
Medical expiry date	31 December 2012				
Restrictions	None				
Previous accidents	None				

Flying Experience

Total hours	190,9
Total past 90-days	6,0
Total on type past 90-days	6,0
Total on type	21,4

A breakdown of the pilots flying hours from the time he started flying on 12 July 2008 until the day of the accident can be found in the column below.

According to the pilot's logbook over the period 12 July 2008 until 11 September 2011 all his flying was conducted on the Robinson R44 except for one flight on 6 July 2009 when he logged 1,6 hours dual on a Agusta 119. On 7 October 2011 he commenced with his type conversion training onto the Bell 206B and completed the conversion on 12 December 2011 when he was signed out in his logbook. During this period he had flown twelve flights with an accumulated flying time of 9,3 hours. It should be noted that all of these flights were with a flight instructor. He then conducted one solo flight on 16 December 2011, with a total duration of 36 minutes. Over the period 18 January 2012 until 19 March 2012 he flew another seven flights. All of these flights were with a flight instructor. Over the period 26 April to 20 May 2012 he conducted five solo flights, with an accumulated flying time of 6,0 hours. His next flight was the accident flight.

Total hours on Robinson R44	167,9
Dual hours on Robinson R44	59,3
Solo hours on Robinson R44	108,6
Dual hours on Agusta 119	1,6
Total hours on Bell 206B	21,4
Dual hours on Bell 206B	14,8
Solo hours on Bell 206B	6,6
Total hours	**190,9**

1.6 Aircraft Information

1.6.1 Airframe

Type	Bell 206B	
Serial number	4119	
Manufacturer	Bell Helicopter Textron	
Year of manufacture	1990	
Total airframe hours (at time of accident)	3015,2	
Last MPI (hours & date)	3007,6	24 April 2012
Hours since last MPI	7,6	
C of A (issue date)	24 October 1990	
C of A (expiry date)	23 October 2012	
C of R (issue date) (present owner)	13 January 2012	
Operating categories	Standard Part 127	

*NOTE: According to the airframe logbook the only work that was conducted on the helicopter post the mandatory periodic inspection referred to above was the fitment of a new battery that was installed on 8 May 2012.

Engine:

Type	Rolls Royce 250-C20J
Serial number	CAE 270501
Hours since new	3 015,2
Hours since overhaul	T.B.O. not yet reached

1.6.2 Mass and balance for the accident flight.

Longitudinal CG
Longitudinal limits Between 106.0 to 114.2 inches from the Datum line

Item	Weight (lbs)	Arm	Moment
Basic empty weight	1 870,88	115,17	215 469,3
Pilot (84 kg)	185	65	12 025
Front left (92 kg)	202	65	13 130
Aft right	0	104	0
Aft middle	0	104	0
Aft left	0	104	0
Baggage (30 kg)	66	148	9 768
Oil	12	179	2 148
Total empty weight	2 335,88	108,1	252 540,3
Fuel quantity	544	117,2	63 756,8
Total take-off weight	**2 879,88**	**109,8**	**316 297,1**

The maximum certified gross weight for the helicopter was not allowed to exceed 3 200 pounds (1451 kg) according to the pilot's operating handbook (POH), Section 2, Limitations.

1.6.3 The helicopter was found to be loaded within its operating limitations as defined in the POH at the time of the accident flight.

1.6.4 According to available information the pilot did not perform a detailed mass and balance calculation as part of his flight planning prior to the flight, nor was any of the performance charts consulted.

1.6.5 The pilot stated that the helicopter *"felt heavy"* during the 1st attempted take-off. He attempted to correct the situation by off-loading one passenger as well as some baggage, where after he managed to took off. He further stated that he noticed that the rotor and engine RPM was low and attempted to increase the engine RPM by "beeping-up" the linear actuator several times with the switch provided on the collective pitch lever, but it did not have any noticeable effect.

1.7 Meteorological information

1.7.1 The meteorological routine report (METAR) for Grand Central aerodrome (FAGC) for 27 May 2012 at 1300Z was obtained. FAGC was the closes reporting weather

office to the accident site and was located approximately 2 nm away. Fine weather conditions prevailed at the time with the wind being from the northeast at 040° at 4 knots and the temperature at 19℃ with a dewpoint of 1℃.

FAGC 271300Z AUTO 04004KT //// // ////// 19/01 Q1029

1.7.2 When ATC cleared the helicopter for take-off the surface wind was communicated to be light and variable with a QNH of 1029 hPa.

1.7.3 The density altitude for the time and place was calculated to be 7 000 feet (pressure altitude was 5 325 ft and temperature 19℃).

1.7.4 The pilot did not obtain an official weather report for the intended flight.

1.8 Aids to navigation

1.8.1 The helicopter was equipped with standard navigational equipment for the helicopter type and there were no recorded defects prior to or during the flight.

1.8.2 In addition to the standard equipment, a hand-held global positioning system was also found at the accident site.

1.9 Communications

1.9.1 The helicopter was equipped with standard communication equipment for the helicopter type. There were no recorded defects prior to the flight.

1.9.2 Initially the pilot advised ATC that they were 3 (1+2) people on-board and requested lift-off for a flight to Rooiberg. ATC cleared the helicopter for lift-off at the pilots' discretion.

1.9.3 Several minutes later the pilot advised ATC that he will be shutting down to off-load some baggage where after he will start up again.

1.9.4 Approximately 20 minutes later, the pilot called ATC again and advised again that they were 3 (1+2) people on-board and requested lift-off for a circuit. ATC cleared the helicopter for lift-off at the pilots' discretion. However, although the pilot reported 3 (1+2) people on-board, there were actually only 2 (1+1) people on-board the helicopter for the flight.

1.9.5 While positioned on a left downwind for runway 35 the pilot called ATC advising them that he will be returning to the aerodrome due to a low rotor RPM condition. This was the last communication between the pilot and the ATC.

1.9.6 A transcript of the communication between the pilot of the accident helicopter ZS-HRZ and ATC at FAGC is attached to this report as Annexure A.

1.10 Aerodrome information

Aerodrome location	Grand Central Aerodrome, 1 nm NE of Halfway House
Aerodrome coordinates	South 25°59'13.99" East 028°08'25.97"
Aerodrome elevation	5 325 feet
Runway designations	17/35
Runway dimensions	1 724 x 23 m
Runway used	Pilot was cleared to use taxiway 35
Runway surface	Asphalt
Aerodrome status	Licensed

1.11 Flight recorders

1.11.1 The helicopter was not equipped with a flight data recorder (FDR) or a cockpit voice recorder (CVR), neither was it required to be to be fitted to this type of helicopter according to the regulations.

1.12 Wreckage and impact information

1.12.1 The helicopter collided with a concrete palisade fence approximately 2 m high next to a public road and then with a blue-gum tree inside the Portland office park, before coming to rest at a GPS position S 25°59'34. 12" E 028°7'37.08" at an

elevation of 5 100 ft above mean sea level (AMSL).

Figure 2: The accident site in relation to the aerodrome (FAGC).

1.13 Medical and Pathological Information

1.13.1 Not applicable.

1.14 Fire

1.14.1 There was no pre- or post-impact fire.

1.15 Survival aspects

1.15.1 Both occupants had worn the aircraft equipped safety harnesses and shoulder harnesses during the accident and none of these failed.

1.15.2 Eye witnesses at the accident site assisted the occupants to get out off the helicopter after the accident.

1.15.3 After the arrival of the Emergency Medical Services (EMS), the pilot was airlifted to a hospital and the passenger was transferred to hospital by road ambulance, both with serious back injuries. The passenger also sustained an injury to his left ankle ligaments, which had to be rectified by surgery.

1.16 Tests and research

1.16.1 Aircraft Airworthiness Status:

1.16.1.1 The helicopter, at the time of the accident, was maintained in accordance with the existing regulations. No outstanding defects had been reported.

1.16.2 Engine Examination

1.16.2.1 On 1 June 2012, the engine, Allison 250-C20J, Serial number CAE 270501, was removed from the wreckage and was taken to an a Rolls-Royce certified maintenance facility in South Africa.

1.16.2.2 The engine was functionally tested on a test bench to an abbreviated version of the Model 250-C20B Overhaul Manual and found to meet all tested parameters.

1.16.2.3 The engine did not reveal any pre- or post-impact failures or conditions that could prevent the engine from normal operation.

1.16.2.4 Attached to this report as Annexure B is a more detailed report on the engine.

1.16.3 Airframe Examination

1.16.3.1 The investigation resulted in the following determinations:

a) Pre-impact control continuity was confirmed. Fractured control surfaces were examined and determined to be as a result of overload.

b) Pre-impact drive continuity was confirmed. The examination confirmed that the impact occurred with very slow turning rotors, but there were rotational signatures throughout the drive system.

c) The drive examination included confirmation that all gearboxes and the freewheeling unit were operating properly.

1.16.3.2 On-site investigation confirmed the presence of an adequate quantity of fuel.

1.16.3.3 The fuel shut-off valve was removed and it was visually confirmed that the valve was in the full open position.

1.16.3.4 There were no pre-impact airframe anomalies identified during the field examination.

1.16.3.5 Attached to this report as Annexure C is a more detailed report on the airframe examination.

1.17 Organisational and management information

1.17.1 This was a private flight with the owner also being the pilot.

1.17.2 The last mandatory periodic inspection that was certified on the helicopter prior to the accident flight was conducted on 24 April 2012 at 3007,6 airframe hours by an aircraft maintenance organisation (AMO) that was in possession of a valid AMO Approval certificate.

1.18 Additional information

1.18.1 Governor operation

1.18.1.1 The linear actuator system control is operated by a switch on the collective pitch lever (see figure 4), which will increase / decrease N2/NR RPM when the switch are either pushed forward or backwards. It is important to note that throttle must be in the fully open for the pilot to be able to manually increase / decrease the N2/NR RPM between the minimum range of 97% and a maximum of 100%.

1.18.1.2 The increase / decrease fine tunes the N2/NR RPM, via the N2 governor, to the desired percentage. The actuator is linked to the Droop Compensator. Together they assist the governor in maintaining a constant RPM. The increase / decrease is normally accomplished during the run-up procedure. The pilot should decrease the linear actuator, to minimum, before opening the throttle. Once the throttle is fully open, the pilot will be able to increase the N2/NR to 100%, which is take-off RPM. However, on occasion the pilot might find himself/herself in a position where he/she wants to reduce NR in order to prevent an overspeed condition when lowering the collective for landing and or during altitude changes. The pilot will then increase NR as he/she increases collective, in order to prevent a low RPM condition.

1.18.1.3 In explaining the operation of "Beeping UP or DOWN" on the throttle, a brief description of the linear actuator system (this is the component being operated by the beep switch), follows:

With reference to N2/NR RPM, which the N2 governor will maintain, the increase / decrease switch extends and retracts the linear actuator on the left side of the engine. This moves the governor arm and adjust the reference main rotor RPM.

The linear actuator is rigged so that the minimum RPM is 97% and maximum RPM is 100%, with the throttle open. If the throttle is at flight idle, the governor is not working; therefore, the increase / decrease switch will not change the N2 RPM. Below 70% N1 the governor is not operational.

1.18.1.4 The Linear Actuator was tested and was found to function correctly.

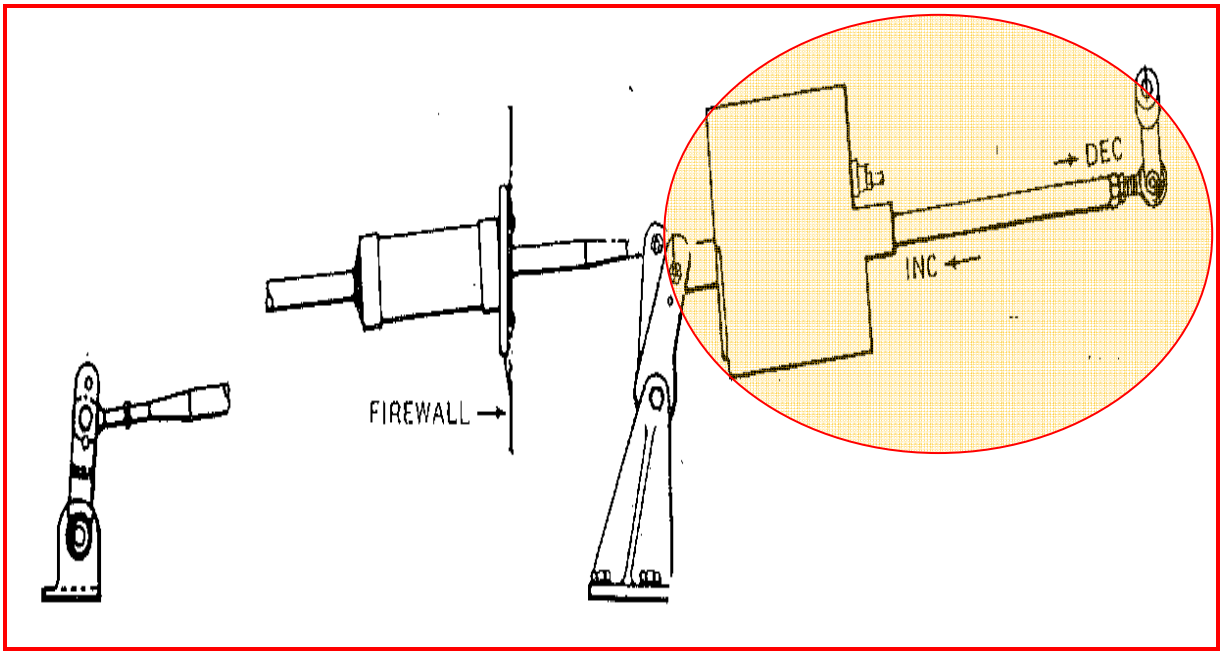

Figure 3. Schematic diagram of the Linear Actuator.

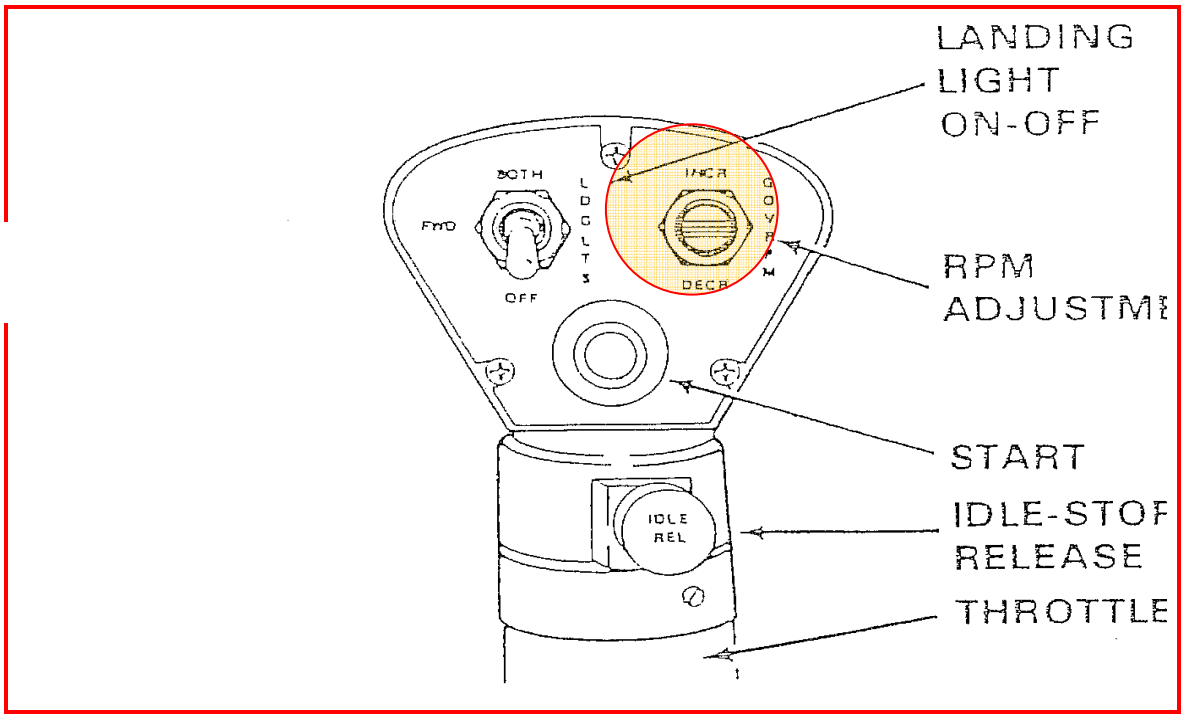

Figure 4. Schematic diagram of the collective pitch lever, indicating the N2/NR RPM adjustment button.

1.18.2 Pilots Operating Handbook, Section 4, Performance

Altitude vs gross weight limit for height - velocity diagram

According to the altitude versus gross weight limit for height – velocity diagram in the POH, the maximum allowable take-off weight on the day with a density altitude

of 7000 feet was not allowed to have exceeded 2 740 pounds (1 243 kg). The take-off weight for the accident flight was calculated to be 2 880 pounds, which was 140 lbs (64 kg) above the gross weight limit as stipulated in the POH, (see the graph on the next page).

ALTITUDE VS. GROSS WEIGHT LIMIT FOR HEIGHT — VELOCITY DIAGRAM

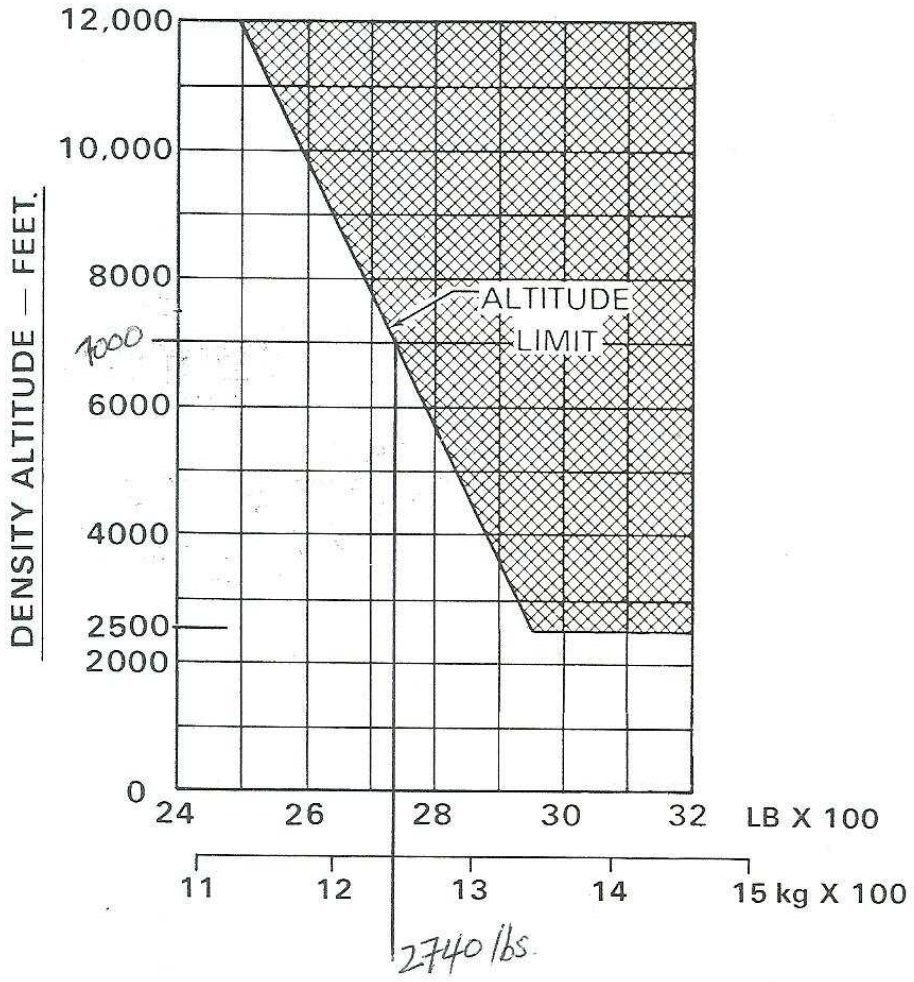

Figure 4-7. Altitude vs gross weight limit for height-velocity diagram

1.19 Useful or effective investigation techniques

1.19.1 None.

2. ANALYSIS

2.1 Man:

2.1.1 The pilot was the holder of a valid private pilot license and had the helicopter type endorsed in his logbook. It was noted from the pilots flying history (logbook) that 70% of his flying that was conducted on the Bell 206B type helicopter comprised of dual flying hours, where he flew with a flight instructor. This practice continued after he had completed his type conversion onto the Bell 206B. One therefore needs to ask the question why. It would appear that the pilot was not confident in his ability to fly the helicopter even though he had completed his type conversion training at a licensed aviation training organization (ATO), which had found him to be proficient to fly this type of helicopter.

2.1.2 The pilot stated that during the 1st took off the helicopter *felt heavy*. His way of correcting the situation was to off load one passenger and some baggage, where after he attempted another take-off. According to the weight and balance calculation the investigating team compiled, the helicopter was being operated outside the weight limitations as specified in the POH altitude vs gross weight limit for height – velocity diagram, with the two occupants onboard. The take-off weight was calculated to be 140 pounds (64 kg) above the maximum certified take-off weight for the given conditions. It is believed that during the 1st take off the helicopter was much heavier, which aggravated the condition even further, however, it also substantiated the statement that was made by the pilot that the helicopter *felt heavy,* as it was indeed *heavy.*

2.1.3 The situation he found himself in at the time indicates that the pilot had not planned the flight properly. If a detailed weight and balance was conducted and the necessary performance graphs in the POH were consulted, the pilot would have been in a position where he would have been able to make a proper assessment prior to attempting to take-off with three adults, baggage and a maximum fuel load. Even after the third occupant and baggage were offloaded the fuel status remained unchanged. The pilot at this stage believed that the lesser weight condition might have solved the problem, however, conditions on the 2nd take-off still equated to an over-weight condition. The only difference being that the pilot was able to become

airborne due to the fact that he was able to gain airspeed by remaining within ground effect for a considerable distance. Once he started to climb conditions changed and power required to sustain flight exceeded the power available and the RPM started to decay, a situation the pilot was unable to correct timeously.

2.1.4 What is concerning is the pilot decision making skills. Once he noted a decay in RPM, he failed to take immediate corrective action by executing a precautionary landing, however he opted to continue with the flight until it was not possible to sustain flight any further. He then ran out of options/ideas and probably had to take evasive action as he was descending towards a public road, it remains uncertain if there were vehicles on the road at the time. He then induced a left turn whereby the helicopter collided with a concrete wall followed by a large tree. The route that was flown after take-off allowed him with ample open spaces where it was possible to have conducted a precautionary landing.

2.2 Machine:

2.2.1 Neither the field nor the post field investigation revealed any anomalies with the engine or the airframe that could have contributed or have caused the accident.

2.2.2 Even though the wreckage displayed extensive impact damage the engine was found to be undamaged and with the assistance of the engine manufacturer, who made an air safety investigator available to travel to South Africa it was possible to subject the engine to a bench test procedure at a certified engine facility. The engine was found to have met all test parameters. The accident could therefore not have been as a result of a loss in engine power/performance during flight.

2.2.3 With the assistance of the helicopter manufacturer an air safety investigator travelled to South Africa to participate in investigation. A detailed inspection of the airframe was conducted over a period of several days. No anomalies could be found to indicate the decay in RPM was as a result of an airframe component malfunction in flight.

2.3 Mission:

2.3.1 The intended flight was nothing out of the norm they would have flown from point A to point B. Following the initial observation by the pilot where he indicated the

helicopter *felt heavy* he opted to land back and decrease the weight. This indicated that the pilot realized the take-off weight was problematic, yet he did not revert to the POH, nor did he do a physical weight and balance calculation, which would have provided him with factual data from which he would have been able to have made a sound decision. He then commenced with a second take off with a passenger onboard, still not sure of the actual take-off weight of the helicopter. He was however, able to become airborne but once the RPM started to decay he elected to continue with the intended flight. This could be seen as a disregard for aviation safety or alternatively incompetence in realizing the need to land.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot held a valid private pilot licence and had the helicopter type endorsed on it. He was therefore appropriately rated to conduct the flight and had accumulated 21,4 flying hours on type, of which 14,8 or 70% of these hours were with a flight instructor.

3.1.2 The pilot was the holder of a valid aviation medical certificate that was issued by a CAA approved medical examiner.

3.1.3 The helicopter was maintained in accordance with the existing regulations and no outstanding defects had been reported. It was in possession of a valid Certificate of Airworthiness at the time.

3.1.4 The density altitude was calculated to be 7 000 feet at FAGC on take-off.

3.1.5 Inspection of the engine did not reveal any pre- or post impact failures or conditions that could prevent the engine from normal operation. The engine was functionally tested and found to meet all tested parameters.

3.1.6 Pre-impact control continuity was confirmed. Fractured control surfaces were examined and determined to be as a result of overload.

3.1.7 Pre-impact drive continuity was confirmed. Examination confirmed that the impact occurred with very slow turning rotors; but, there were rotational signatures

throughout the drive system. The drive examination included confirmation that all gearboxes and the freewheeling unit were operating properly.

3.1.8 It was confirmed during the on-site investigation that an adequate quantity of fuel was onboard the helicopter, with a substantial amount still contained within the bladder type fuel tank.

3.1.9 The fuel shut-off valve was removed and it was visually confirmed that the valve was in the full open position at the time of the accident.

3.1.10 Dual flight controls were installed in the cockpit at the time of the accident flight.

3.1.11 There were no pre-impact airframe anomalies identified that could have contributed or have caused the accident.

3.1.12 The take-off weight of the helicopter was found to be 140 lbs (64 kg) above the limits as stipulated in the POH, altitude vs gross weight limit for height – velocity diagram.

3.2 Probable cause/s

3.2.1 The pilot allowed the main rotor RPM to decay and did not took any corrective action prior to impacting with a concrete wall.

3.3 Contributing factor(s):

3.3.1 Improper flight planning. (Pilot did not opt to perform a proper weight and balance calculation prior to the flight, nor has he consulted the appropriate performance graphs in the POH. He further indicated that he had not obtained an official weather report for the flight).

3.3.2 Lack of decision making. (The pilot failed to execute a precautionary landing when he identified the problem and opted to continue with the flight placing himself and his passenger at risk).

3.3.3 Lack of familiarity with the helicopter type. (It was found that 70% of the pilots flying that was conducted on the Bell 206B was with a flight instructor).

4. SAFETY RECOMMENDATIONS

4.1 In the interest of aviation safety it is recommended to the Director for Civil Aviation that the pilot's training records pertaining to the Bell 206B be reviewed for any remedial directives. It is further recommended that should he wish to revalidate his pilot license following his serious injury he suffered during the accident he should be subjected to a flight test on the Bell 206B with a designated flight examiner appointed by the regulating authority.

5. APPENDICES

5.1 Annexure A (Transcript of communication between ZS-HRZ and ATC at FAGC)
5.2 Annexure B (Engine investigation report)
5.3 Annexure C (Airframe investigation report)

Annexure A

A transcript of communication between the accident aircraft ZS-HRZ and ATC at FAGC.

Identification	***Time & Message***
ZSHRZ1	***12:53:17***
ZS-HRZ	*Central tower Good day Hotel Romeo Zulu.*
FAGC Tower	*Last caller confirm Romeo Hotel Zulu?*
ZS-HRZ	*Ah Hotel Romeo Zulu is a Jetranger we are one plus two on board we at NAC we'd like to lift off for a flight to Rooiberg, Hotel Romeo Zulu.*
ZSHRZ2	***12:53:52***
FAGC Tower	*Hotel Romeo Zulu just confirm your routing to Rooiberg?*
ZS-HRZ	*Ah we gonna route out north ah between ah Waterkloof and ah Lanseria over the ridge.*
FAGC Tower	*Hotel Romeo Zulu lift off pilot's discretion, taxiway three five, the surface wind is light and variable, QNH one zero two niner, report outbound to the north.*
ZS-HRZ	*Ah QNH one zero two nine, ah lift off own discretion, taxiway three five, call outbound to the north.*
ZSHRZ3	***12:54:24***
ZS-HRZ	*Tower can I just confirm the QNH one zero two nine?*
FAGC Tower	*Affirm, QNH is one zero two niner.*
ZS-HRZ	*Thank you Maam.*
ZS-HRZ4	***12:56:59***
ZS-HRZ	*Central tower, Hotel Romeo Zulu.*
FAGC Tower	*Romeo, Hotel Romeo Zulu Central go ahead?*
ZS-HRZ	*Hotel Romeo Zulu we going to shut down, I'm just going to off load some baggage and we'll start up again.*
FAGC Tower	*Hotel Romeo Zulu report ready?*
ZS-HRZ	*Report next, ah ready to start.*
ZSHRZ5	***13:16:27***
ZS-HRZ	*Central tower, Hotel Romeo Zulu.*

FAGC Tower	*Hotel Romeo Zulu Central go ahead.*
ZS-HRZ	*Ah Hotel Romeo Jetranger at NAC we one plus two on board we'd like to lift off for a flight to Rooiberg Hotel Romeo Zulu.*
FAGC Tower	*Hotel Romeo Zulu, QNH one zero two niner, Taxi (..) correction lift off pilot's discretion, taxiway 35, surface wind light and variable, report outbound to the north.*
ZS-HRZ	*Ah QNH one zero two nine, ah lift off own discretion, taxiway three five, call outbound to the north next Hotel Romeo Zulu.*
ZSHRZ6	***13:17:57***
ZS-HRZ	*Central Tower Hotel Romeo Zulu*
FAGC Tower	*Hotel Romeo Zulu Central go ahead*
ZS-HRZ	*Ah (…. Have power related.?..) I'd just like to do one circuit please*
FAGC Tower	*Hotel Romeo Zulu copy that, lift off pilot's discretion, Taxiway 35, report left downwind grass 35*
ZS-HRZ	*Ah taxiway 35, report left downwind for the grass*
ZSHRZ7	***13:21:23***
ZS-HRZ	*Ah Central Tower, Hotel Romeo Zulu taking a short cut back to the ah back to the pad I've got a low Rotor RPM*
FAGC Tower	*Hotel Romeo Zulu report final approach grass 35.*
ZSHRZ8	***13:21:44***
FAGC Tower	*Hotel Romeo Zulu confirm intentions.*
Unknown	*(…… he's just gone..) Ah Maam that helicopter's just gone down.*
FT3	*Central Tower Foxtrot Tango 3 ready.*
FAGC Tower	*Foxtrot Tango 3 a Jetranger just went down west of Grand Central.*
FT3	*Say again.*
FAGC Tower	*Foxtrot Tango 3 did you copy?*
FT3	*Say Again Maam?*
FAGC Tower	*Foxtrot Tango 3 a Jetranger just went down west of Grand Central, past the Gautrain railway line.*
FT3	*Okay copied, we'll proceed there Foxtrot Tango 3 and company.*
FAGC Tower	*Foxtrot Romeo Oscar, confirm you can see where the helicopter went down.*
FRO	*Maam we saw him go in but we can't see him now, standby we'll orbit the area.*
	13:22:46
	Standby ... Dial tone ……. (K, Bundy) One, plus two kay, where are we, where are we, where are we, Midrand Fire Station, Midrand Police.
	Electronic telephone key signatures (Call to Central Say again, okay Maam we've got the helicopter visual, Ah they went down) electronic telephone key signatures.
	Can you get (coordinates) for his position, just check, Ah Foxtrot Romeo Oscar confirm you have co-ordinates for the position, standby, Okay I've got paper.
	(co-ordinates broadcast) Five Three Five, (co-ordinates broadcast) just tell him to say it again, Foxtrot Romeo Oscar ….. (co-ordinates rebroadcast) Five Two, Ja, (got it)

Annexure B

Engine Investigation Report (Allison 250-C20J, Serial number CAE 270501)

Engine Information:

- The engine was removed from the wreckage at the Wonderboom aerodrome near Pretoria, South Africa by the investigation team.

- The power turbine governor and the gas producer fuel control were securely mounted and no damage was noted.

- There was approximately two teaspoons of fuel in the metered fuel line between the in-line check valve and the fuel nozzle.

- There was no visible evidence of ingestion of foreign material into at least the first thru third stage compressor blades.

- There was continuity in the N2 drive train between the fourth stage turbine wheel and the engine to transmission drive shaft through the accessory gearbox. Both turned freely.

- The N2 tachometer generator drive pad in the accessory gearbox turned freely.

- The compressor turned freely and continuity of the N1 drive train through the accessory gearbox to the starter generator was confirmed.

- The starter generator, N1 tachometer generator, and fuel control drive pads on the accessory gearbox rotated freely.

- The engine was delivered to a Rolls-Royce certified engine facility in South Africa for additional investigation.

- The engine had been installed in the helicopter since new and had a total time of approximately 3015,2 hours.

Engine Investigation:

The engine was removed from the wreckage and was subjected to an engine bench test procedure at a Rolls-Royce certified engine facility in South Africa. The SACAA investigator-in-charge (IIC) representative presided over the investigation and the following was noted:

The following cursory inspections were completed prior to installing the engine on the test cell.

- The N1 and N2 drives rotated freely with no unusual noises noted.
- All air, oil and fuel lines and their associated fittings were found at least finger tight.
- The upper and lower chip detectors were clean.

The engine was installed on the test cell and an abbreviated engine test run schedule was performed as per the Model 250-C20J Overhaul Manual. The following information provides a chronology of the engine test:

First Run:

- The Fuel Control Unit flow setting was noted set at low flow.
- Fuel inlet pressure met specification.
- Engine motoring was completed to confirm oil and fuel flow to sumps and accessories.
- Engine ignition occurred and the engine accelerated to ground idle normally.
- At 100% N2 and 96% N1 the engine was shut-down due to a high Turbine Outlet Temperatures (TOT) indication.

The TOT harness was removed and replaced with a similar part number (new harness) that was provided by engine test facility. The bench test continued with the new TOT harness fitted.

Second Run:

- Engine ignition occurred and engine accelerated to ground idle normally.
- A slow acceleration to takeoff power was completed successfully.
- The compressor bleed valve closed at 94% N1 - within specification.
- Acceleration from flight autorotation to takeoff was performed successfully.
- Governor droop testing was completed – within specification.
- A timed acceleration to takeoff power was performed and was found within specification.
- Acceleration from flight idle to takeoff and deceleration back to flight idle was performed – within specification.

Summary of Findings:

- Inspection of the engine did not reveal any pre or post impact failures or conditions that would prevent the engine from normal operation.
- The engine was functionally tested to an abbreviated version of the Model 250-C20B Overhaul Manual and found to meet all tested parameters.

Annexure C

Airframe Investigation Report (Bell 206B, Serial number 4119).

Narrative

The aircraft was refueled at Grand Central aerodrome, near Midrand, South Africa. The pilot attempted to depart with two passengers and baggage onboard, but determined that the aircraft was *too heavy*. One passenger with baggage exited the aircraft and the pilot contacted ATC and requested clearance to "fly one circuit."

It is unknown if the intent was to deliver the one passenger and baggage and then return for the other passenger or if he intended to burn off some fuel before continuing the flight. Shortly after takeoff, the pilot of the accident aircraft contacted the air traffic controller and requested clearance to return to the airport because he was losing rotor rpm. Shortly after the request to return to the airport another aircraft in the vicinity radioed the air traffic controller and stated that the aircraft the two occupants sustaining serious injuries.

A on-site investigation was conducted over the period 31 May to 2 June 2012. The investigation resulted in the following determinations:

1. Pre impact control continuity was confirmed. Fractured control surfaces were examined and determined to be as a result of overload.

2. Pre impact drive continuity was confirmed. The examination confirmed that the impact occurred with very slow turning rotors, but there were rotational signatures visible throughout the drive system.

3. The drive examination included confirmation that all gearboxes and the free-wheeling unit were operating properly.

4. On-site investigation confirmed the presence of an adequate quantity of fuel.

5. The fuel shutoff valve was removed and it was visually confirmed that the valve was in the full open position on impact.

6. There were no pre impact airframe anomalies identified during the field and post field examination.

Summary

All indications suggest that the accident was as a result of improper procedures, executed by a very inexperienced pilot on the helicopter type. The information obtained supports that the pilot failed to maintain proper rotor rpm for flight.

Compiled by:

..... Date: 13 September 2012
For: Director of Civil Aviation

Investigator-in-charge: _____ Date: 1 November 2012

Co-Investigator: _____ Date: 1 November 2012