AIRCRAFT ACCIDENT REPORT AND EXECUTIVE SUMMARY

				Reference:	CA18/2/3/8893		
Aircraft Registration	**ZU-RDS**	**Date of Accident**	5 February 2011		**Time of Accident**	1030Z	
Type of Aircraft	Magni Gyro M16		**Type of Operation**		Private		
Pilot-in-command Licence Type		Gyroplane	**Age**	55	**Licence Valid**	Yes	
Pilot-in-command Flying Experience		Total Flying Hours	233.0		Hours on Type	233.0	
Last point of departure	Bucks Private Aerodrome (10 km south of the town of Douglas) (Northern Cape province)						
Next point of intended landing	Bucks Private Aerodrome (10 km south of the town of Douglas) (Northern Cape province)						
Location of the accident site with reference to easily defined geographical points (GPS readings if possible)							
On a private aerodrome (Bucks Aerodrome) at the GPS position S 29°5'16" E 23°43'49"							
Meteorological Information	Wind: 340°TN/06 knots; Temperature: 25°C; Dew Point : 15°C; Visibility: >10 km; Clouds: 3-4 eights at 3500 ft.						
Number of people on board	1+1	**No. of people injured**	1+1	**No. of people killed**	0		

Synopsis

On Saturday 5 February 2011 at approximately 1030Z the pilot, accompanied by a passenger, took off from Bucks Aerodrome on a private flight with the intention of landing back at the aerodrome which was located on a farm 10 km south of Douglas.

After rotation from Runway 16, the gyrocopter was unable to gain altitude. The pilot then opted to land back straight ahead on the runway and entered an autorotation. According to the pilot his rate of descent was high and he touched down with no forward speed. The tail of the gyrocopter made contact with the runway first, whereafter the gyrocopter bounced.

The gyrocopter rolled over onto its right side and a post-impact fire erupted.

Both occupants suffered serious burn injuries during the post-impact fire.

The gyrocopter was consumed by the post-impact fire.

Probable Cause

Failure to maintain flying speed, resulting in a hard landing in a tail low attitude.

Contributing factors

Overloading condition.
Density altitude.
Downwind take-off/wind shear could not be excluded.

IARC Date		Release Date	

AIRCRAFT ACCIDENT REPORT

Name of Owner/Operator **:** A.J. Greedy
Manufacturer **:** Magni Gyro
Model **:** Magni M16
Nationality **:** South African
Registration Marks **:** ZU-RDS
Place **:** Bucks Aerodrome near Douglas (Northern Cape province)
Date **:** 5 February 2011
Time **:** 1030Z

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 05 February 2011, at 1030Z, a Magni Gyro M 16, registration ZU-RDS, which was operated and flown by the owner, took off from Bucks Aerodrome on a private flight with a passenger on board. The intention was to land back at the aerodrome. The flight was being conducted under visual meteorological conditions (VMC).

1.1.2 According to the pilot, the takeoff roll from Runway 16 was normal. At a speed of approximately 70 miles per hour (mph) he rotated the gyrocopter. After rotation he noted that the gyrocopter was “sluggish” and would not climb. The pilot then engaged the turbo, but the engagement of the turbo had no effect and did not improve the situation. **(See Appendix A)**

1.1.3 The pilot then decided to land the gyrocopter back on the runway. He stated that he then closed the power (retard the throttle to the idle position) and carried out an auto rotation landing.

1.1.4 According to the pilot, the rate of descent was high and he touched down with no forward speed. The tail of the gyrocopter made contact with the ground first, where-after the gyrocopter bounced and rolled onto its right side and a post-impact fire erupted.

1.1.5 The passenger assisted the pilot after he had difficulty in releasing his safety

harness. Both occupants sustained serious burn injuries during the evacuation and the gyrocopter was consumed by the post-impact fire.

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 gyrocopter was consumed by the post-impact fire after coming to rest on its right side. **(See Fig. 1)**

Figure 1 A view of the wreckage.

1.4 Other Damage

1.4.1 No other damage was caused during the sequence of the accident.

1.5 Personnel Information

Nationality	South African	Gender	Male	Age	55
Licence Number	0272269671	Licence Type	Gyroplane		
Licence valid	Yes	Type Endorsed	Yes		
Ratings	None				
Medical Expiry Date	28 February 2012				
Restrictions	Corrective lenses				
Previous Accidents	None				

Flying Experience :

Total Hours	233.0
Total Past 90 Days	13.8
Total on Type Past 90 Days	13.8
Total on Type	233.0

1.6 Aircraft Information

Airframe :

Type	Magni Gyro M16	
Serial Number	16021974	
Manufacturer	Magni Gyro	
Year of Manufacture	2002	
Total Airframe Hours (At time of Accident)	1161.2	
Last Annual Inspection (Date & Hours)	6 June 2010	1100.2
Hours since Last Annual Inspection	61.0	
Authority to Fly (Issue Date)	2 July 2010	
C of R (Issue Date) (Present owner)	15 December 2008	
Operating Categories	Standard	

Engine :

Type	Rotex 914
Serial Number	4418146
Hours since New	1161.2
Hours since Overhaul	171.7

Propeller :

Type	Arplast
Serial Number	No serial number
Hours since New	359.0
Hours since Overhaul	No overhaul done

Weight calculation

Gyrocopter empty weight	329 kg
Fuel	47 kg
Pilot	80 kg
Passenger	70 kg
Total	**526 kg**

The take-off weight was 526 kg, which exceeded the maximum allowable take-off weight for this gyrocopter by 26 kg.

1.7 Meteorological Information

1.7.1 The meteorological information was obtained from the South African Weather Service. (METAR for Kimberley.) The most likely weather conditions at the time of the accident are given in the table below.

Wind direction	340°M	Wind speed	06 knots	Visibility	10 km
Temperature	25°C	Cloud cover	2-4 eighths	Cloud base	3500 ft
Dew point	15°C				

1.7.2 The temperature was estimated to have been 25°C, the Quantity Navigational Height (QNH) 1020 hPa and the field elevation 3400 feet (ft). The density altitude was calculated to be 5328 ft at the aerodrome at the time of the accident.

1.8 Aids to Navigation

1.8.1 The gyrocopter was equipped with standard navigational equipment as required by the Regulator. There were no recorded defects to navigational equipment prior to the flight.

1.9 Communications

1.9.1 The gyrocopter was equipped with standard communication equipment as required by the Regulator. There were no recorded defects to communication equipment prior to the flight.

1.10 Aerodrome Information

The accident did not occur at or near an aerodrome. The accident occurred at an (unlicensed) aerodrome, which was located 10 kilometres south of the town of Douglas (Northern Cape province) at the GPS position S 29°5'16" E 23°43'49". The length of the runway was 1200 m with a runway orientation of 16/34. **(See Fig 2.)**

Figure 2 A view of the runway with the accident site at the end of the runway.

1.11 Flight Recorders

1.11.1 The gyrocopter was not fitted with a cockpit voice recorder (CVR) or a flight data recorder (FDR) and neither was required by regulations to be fitted to this type of gyrocopter.

1.12 Wreckage and Impact Information

1.12.1 Primary debris path

The primary debris path was in a radius of approximately 40 metres towards the end of the runway.

1.12.2 Final position of the wreckage

The final position of the wreckage was found to the right side towards the end of Runway 16 with the nose of the gyrocopter facing in a north-easterly direction, lying on its right side.

1.12.3 The gyrocopter was consumed by the post-impact fire.

1.13 Medical and Pathological Information

1.12.1 The pilot and his passenger sustained serious burn wounds during the accident. The pilot was rescued from the burning wreckage by his passenger. An eye-witness rushed to the scene and extinguished the flames on both occupants with a fire extinguisher. The witness also called the emergency services, which only arrived on the scene after both occupants had been taken to hospital in a private vehicle.

1.12.2 Both occupants were taken to hospital, where they were treated for serious burn wounds. The pilot-in-command was only released from hospital eight months after the accident.

1.14 Fire

1.14.1 The gyrocopter was consumed by the post-impact fire which was caused by a ruptured fuel tank which caused a fuel spillage onto the hot engine and exhaust manifold. The fire was extinguished by the eye-witness who rushed to the scene of the accident and made use of a fire extinguisher.

1.15 Survival Aspects

1.15.1 The accident was considered survivable as the cockpit area was associated with relatively low kinetic energy forces and the cockpit area remained fairly intact before it was consumed by the post-impact fire. Both occupants were making use of the aircraft-equipped safety harnesses, which did not fail during the sequence of the accident.

1.15.2 Due to the intensity of the post-impact fire, both occupants sustained serious burn injuries before they could escape from the wreckage.

1.16 Tests and Research

1.16.1 None.

1.17 Organisational and Management Information

1.17.1 At the last annual inspection prior to the accident flight, on 6 June 2010, the aircraft was certified at 1100.2 airframe hours by an Approved Person (AP).

1.17.2 During the investigation the Recreation Aviation Administration South Africa (RAASA) provided the Investigator-In-Charge with documentation indicating that at the time of the accident the aircraft involved in the accident had been flown without a valid Authority to Fly (ATF).

Upon further investigation, the CAA aircraft file revealed that the gyrocopter had been in possession of a valid ATF at the time of the accident.

1.18 Additional Information

1.18.1 According to the passenger who was on board the gyroplane at the time of the accident, after becoming airborne, which was at a point approximately halfway down the runway, the pilot-in-command reported a loss of power from the engine and he was experiencing difficulty in maintaining flight.

1.18.2 The passenger stated that he did not hear any abnormal engine noises and there was no indication of anything out of the ordinary happening at that point. However, during an interview with the passenger two days after the accident, the passenger informed the investigator-in-charge, that at this point he was looking over the pilot's shoulder and could see the airspeed indicator indicating 45 miles per hour (mph).

1.18.3 According to an eye-witness, also a pilot, who was driving his vehicle next to the runway when the gyrocopter took off, the takeoff was in a southerly direction, Runway 16. According to him the engine sounded normal at the time. When the gyrocopter was nearing the end of the runway, it was approximately 10 metres (m) above the runway.

1.18.4 The eye-witness further stated that it looked as if the gyrocopter was suddenly turning back to the runway, but instead it went into what appeared to be an uncontrolled slide towards the ground, collided with the ground and burst into flames. This statement corresponds with the statement of the passenger who stated that the gyrocopter made a shallow "S" turn, returning to the runway where the gyrocopter struck the ground.

1.18.5 The witness stated that both occupants were on fire when they stumbled away from the wreckage and that he had to use a fire extinguisher to put out the flames from their burning clothes.

1.18.6 The pilot of the accident gyrocopter stated that on the day of the accident, he had to contend with a cross-wind from the left during take-off.

1.18.7 The pilot stated that after engaging the turbo by pushing the throttle into the required slot, the engine did not respond accordingly and he opted to abort the takeoff.

The Rotorcraft Flying Handbook (p 21-1) (Federal Aviation Administration) states the following regarding a Gyroplane aborted takeoff:

"*If the gyroplane has left the surface when the decision to abort is made, reduce the throttle until an appropriate descent rate is achieved. Once contact with the surface is made, reduce the throttle to idle and apply aerodynamic braking as before".*

1.18.8 The pilot indicated that the rate of descent was high.

The Rotorcraft Flying Handbook (p 20-12 to p 20-13) (Federal Aviation Administration) states the following regarding a high rate of descent:

"*A gyroplane will descend at a high rate when flown at very low forward airspeeds. This manoeuvre may be entered intentionally when a steep descent is desired, and can be performed with or without power. An unintentional high rate of descent can also occur as a result of failing to monitor and maintain proper airspeed. In*

powered flight, if the gyroplane is flown below minimum level flight speed, a descent results even though full engine power is applied. Further reducing the airspeed with aft cyclic increases the rate of descent. For gyroplanes with a high thrust-to-weight ratio, this manoeuvre creates a very high pitch attitude. To recover, the nose of the gyroplane must be lowered slightly to exchange altitude for an increase in airspeed."

1.18.9 No data could be downloaded from the Turbo Control Unit (TCU) as it was consumed by the post-impact fire.

1.18.10 No technical evaluation of the engine was possible due to the damage caused to the engine during the post-impact fire.

1.19 Useful or Effective Investigation Techniques

1.19.1 None

2. ANALYSIS

2.1 The pilot was properly licensed and qualified for the flight and in possession of a valid medical certificate which imposed certain restrictions which were adhered to.

2.2 The gyroplane was properly certified, equipped and maintained in accordance with the prescribed Civil Aviation Regulations.

2.3 The takeoff was done in an overweight condition with a calculated density altitude of approximately 5328 ft. This certainly had an influence on the performance of the gyrocopter, which then was possibly recognised by the pilot as a power loss.

2.4 At a height of approximately 10 metres above the runway, when the pilot made the decision to abort the take-off, his options were limited by time to initiate any other techniques except to enter an autorotation, to carry out a normal landing.

The possibility of wind shear and a possible downwind take-off could not be ruled out. The wind socks on the surface might not have reflected a downwind situation but once at a height of ±30 ft AGL, the wind might have caught the pilot off guard so that he failed to maintain flying speed and allowed the gyrocopter to stall. This would explain the observation that was made by the eye-witness that the gyrocopter was in a sideways slide before colliding with the ground in a tail-low attitude, which indicates clearly that there was no control over the gyrocopter at that stage.

3. CONCLUSION

3.1 Findings

3.1.1 The pilot was properly certified and qualified to perform the flight.

3.1.2 The gyrocopter was properly certified, equipped and maintained in accordance with the Civil Aviation Regulations.

3.1.3 At the time of the takeoff, the gyrocopter's maximum takeoff weight was exceeded

by 26 kilograms.

3.1.4 The pilot could not maintain flying speed following takeoff, which probably caused the gyrocopter to stall.

3.2 Probable Cause/s

3.2.1 Failure to maintain flying speed, resulting in a hard landing in a tail-low attitude.

3.3 Contributing factors

3.3.1 Overloading.

3.3.2 Density altitude.

3.3.3 Downwind take-off/wind shear could not be excluded.

4. SAFETY RECOMMENDATIONS

4.1.1 It is recommended to the Director of Civil Aviation that the South African Civil Aviation Authority (SACAA) and the Recreation Aviation Administration South Africa (RAASA) immediately engage in a proper and workable process whereby aircraft and pilot documentation are controlled and maintained between these two organisations in synchronization (not conflicting as was experienced in this investigation). During this investigation RAASA provided the IIC with documentation indicating that the aircraft involved in this accident was flown without a valid Authority to Fly (ATF), while the investigator found the contrary when the CAA file was assessed.

5. APPENDICES

5.1 Appendix A Throttle/turbo power setting

2.11.2 THROTTLE LEVER

The throttle lever (1) allows the engine speed (r.p.m.) to be varied and thus to vary the power delivered. Moving the throttle forward opens the carburettors" throttle valve, thus increasing the power delivered. Moving the throttle backward reduces the power delivered.

With the ROTAX 914, the throttle's movement goes from 0 to 115% of maximum continuous power. During the travel from 0 to 100%, the power is delivered proportionally to the movement of the throttle lever, so that it can be modulated. Once it reaches 100%, a stop (2) blocks the lever's forward movement.

To make use of the maximum available power (115%), the pilot must press the lever (1) slightly towards the inside of the cockpit (3) to get beyond the stop and then continue the forward movement.

Once the lever moves beyond the 100% stop, the power delivered is not proportional to the movement, as the engine boosting does not take place in a linear manner.

115% power can be used when necessary for takeoff operations, always taking care not to exceed the engine's maximum speed (5800 r.p.m.).

NOTE:
The maximum continuous power for takeoff is given at 100% of the delivered power. The maximum available power (115%) can only be used for not more than 5 minutes. After 5 minutes, the management system of the turbo automatically reduces the delivered power until reaching the maximum value of continuous power (100%).