ACCIDENT

Aircraft Type and Registration:	Magni gyroplane M24C Orion, G-CGTI
No & Type of Engines:	1 Rotax 914-UL turbocharged piston engine
Year of Manufacture:	2010
Date & Time (UTC):	28 April 2011 at 1131 hrs
Location:	North of Hilltop Way, near Old Sarum Airfield, Wiltshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Fatal) Passengers - N/A
Nature of Damage:	Aircraft destroyed
Commander's Licence:	Private Pilot's Licence (Gyroplanes)
Commander's Age:	51 years
Commander's Flying Experience:	128 hours (of which 25 were on type) Last 90 days - 20 hours Last 28 days - 7 hours
Information Source:	AAIB Field Investigation

Synopsis

The pilot departed Old Sarum Airfield for a local flight in his M24C gyroplane and shortly after it became airborne the 'gull-wing' door was seen to open to the horizontal position. The pilot made a radio call that he had a problem with the door and intended to return to the airfield. The aircraft continued around the circuit until the end of the downwind leg, where the pilot appeared to position the aircraft to land in a field. At the end of the flight the engine noise was heard to reduce and the aircraft was seen to roll to the left before it crashed into the field and caught fire. The investigation established that at the start of the flight the pilot's door appeared to be closed but the latching mechanism had not locked the door in the closed position.

As a result of the findings of the investigation a number of safety actions were taken by the aircraft manufacturer's UK representative and the Civil Aviation Authority. One Safety Recommendation is made to the Civil Aviation Authority.

History of the flight

The pilot arrived at Old Sarum Airfield, Salisbury, at around 0900 hrs and conducted the pre-flight check of his gyroplane, which had approximately 40 ltr of fuel onboard. He then lent the aircraft to the instructor who had taught him to fly gyroplanes for a five-minute flight with a passenger. The instructor departed the airfield at 1033 hrs and subsequently advised the investigation

that the aircraft had performed normally and he had no difficulty in closing and locking the aircraft doors.

The pilot completed the preparations for his flight and at 1120 hrs called Old Sarum Radio to request airfield details for a local flight to the south and was advised that Runway 06 was in use with a right hand circuit. The aircraft was then seen to taxi to the holding point where the pilot conducted the power checks and at 1128 hrs called ready for departure. The ground radio operator passed the surface wind as 030º at 10 kt and as there was no traffic to conflict with G-CGTI the pilot commenced his takeoff run. At this time there were two other aircraft in close proximity to the airfield: a fixed wing aircraft joining the circuit on the base leg and a gyroplane on the downwind leg, piloted by a student and the instructor who had flown G-CGTI earlier in the day.

The radio operator observed G-CGTI commence its takeoff run, with its doors apparently closed. The aircraft then disappeared from view and when the operator next saw it, at a height of about 15 ft, it had a marked right yaw, right roll and the left door was open in the horizontal position. The aircraft recovered to a more normal attitude and climbed to approximately 300 ft agl before turning onto the crosswind leg. It was then seen to continue to climb and fly around the circuit at what appeared to be the normal height of 600 ft for this type of aircraft. Shortly after turning onto the crosswind leg the pilot made a radio call, indicating that he had a problem with his door and he was returning to the airfield. Once the radio operator acknowledged the call, the pilot's instructor made a radio call to G-CGTI advising the pilot to "ignore the door and to concentrate on flying the aircraft." The instructor, aware that there was an aircraft joining on left base, also declared an emergency on behalf of G-CGTI to ensure he received priority to land.

The gyroplane continued along the downwind leg, at what appeared to be a faster speed than normal, and after turning onto the base leg it was seen to descend rapidly and perform a tight right turn. When the aircraft was close to the ground it appeared to flare and momentarily stopped descending before it rolled to the left and crashed. The pilot of the aircraft joining base leg observed the accident and made the radio call "the gyro has crashed, it's burst into flames". The instructor in the gyroplane, who had just carried out a 'touch-and-go' on Runway 06, saw the smoke from the accident site and flew immediately to the area, landing in the same field as G-CGTI. His student left the aircraft to offer assistance to the pilot, but the intense fire prevented him, and other individuals in the immediate vicinity, from approaching the scene.

Witnesses

In addition to two witnesses in the tower, there were a number of other witnesses at the airfield who were consistent in their reports of the flight path and attitude of the gyroplane as it flew around the circuit. However, there was inconsistency as to the direction of the final turn.

A gyroplane student observed the aircraft shortly before it crashed. He had a good view of the left side of the gyroplane and noticed that the aircraft was slightly lower and seemed to be flying faster than normal, but he did not recall seeing either of the doors open.

The pilot in the aircraft, which was joining base leg, observed the gyroplane perform a tight turn into wind (030°) over a large flat field in which it appeared that the pilot of G-CGTI was attempting to land. He then saw G-CGTI "roll to the left and it appeared to hit the ground instantly and within a couple of seconds it burst into flames".

Witnesses in the area of the accident site describe the aircraft flying very fast and very low, in an unstable manner. They described a tight right turn, low over a housing estate, followed by a flare when the aircraft stopped descending. There was then a marked reduction in the noise produced by the engine, followed by the gyroplane rolling rapidly to the left and the nose dropping before the aircraft struck the ground. None of these witnesses could recall seeing the gyroplane's doors open.

Weather

The general situation, at the time of the accident, was dominated by high pressure, with very little or no cloud, no significant weather, and good visibility. There was a north to north-easterly wind with the surface wind at Old Sarum being 030º at 10 kt and the wind at circuit height was calculated to be 040º at 16 kt. Flying conditions at the time of the accident were described by the instructor as moderately bumpy.

Pilot's background

In June 1996 the pilot started learning to fly helicopters and was awarded his Private Pilot's Licence (Helicopters) in January 1997. His last recorded flight in command of a helicopter was in April 1997.

In July 2010 the pilot commenced his training in gyroplanes, predominantly on the Magni M16C, and in September he test flew a M24C and ordered an aircraft shortly afterwards. He was awarded his Private Pilot's Licence Gyroplanes PPL(G) in January 2011 and immediately commenced his conversion training onto the M24C, which he completed in February 2011. He then continued to fly with his instructor, completing his first solo flight in the M24C in April 2011. At the time of the accident the pilot had a total of 12:55 hrs in command of gyroplanes, with 2:35 hrs in command of the Magni M24C. The pilot's training records show satisfactory progress throughout the PPL(G) course.

Pathology

The post-mortem report concluded that the pilot died of multiple injuries sustained during the initial impact and the forces involved were such that the accident was not considered to be survivable. No evidence was found of natural disease which could have contributed to the crash. Toxicological analysis of the pilot's blood concluded there were no traces of alcohol or drugs.

Recorded information

Introduction

A portable GPS, operating a SkyDemon-manufactured flight planning software application, was recovered from the aircraft and found to contain a partial track log of the accident flight. The track log provided aircraft GPS-derived position, altitude and groundspeed recorded at a nominal rate of once every ten seconds. Track log information is automatically stored when the groundspeed exceeds 35 mph. Logging stops when the GPS is turned off, the SkyDemon software application is manually stopped, the groundspeed remains at less than 12 mph for a period of 20 seconds or the GPS signal is lost for a period of 30 seconds.

The aircraft was also equipped with an engine health monitoring system. However, the unit was severely damaged during the accident and no data could be retrieved. Recorded radar data was not available.

Interpretation of GPS data

A total of 14 data points were recorded over a period of two minutes eleven seconds. From the GPS groundspeed, an approximate airspeed has been derived based on a calculation of the wind at 600 ft being from 040° at 18 mph.

At 1127:23 hrs, with the aircraft positioned near to the threshold of Runway 06, the first data point was logged at a ground speed of 37 mph and at a recorded altitude within 11 ft of the actual terrain altitude. The aircraft then proceeded to track the runway before climbing and making a right turn (Figures 1 and 2). The aircraft climbed steadily at an average rate of approximately 500 ft/min and an average airspeed of about 79 mph, whilst positioning onto an approximate downwind track.

At 121 seconds after the initial data point, the aircraft was at an altitude of 872 ft amsl (587 ft above nominal airfield level - the published circuit height at Old Sarum was 600 ft for this aircraft type). Ten seconds later, at 1129:34 hrs, the final data point was recorded. The altitude was the same as the previous data point, being 872 ft, although the airspeed had increased from approximately 84 mph to about 99 mph, which is faster than the typical airspeed of 60 to 70 mph. The aircraft was on a track of 291° and due to rising ground the approximate height reduced to 525 ft. The final position placed the aircraft 160 m to the west of the accident position and approximately 0.5 nm from the threshold of Runway 06.

The track log file was closed at 1130:04 hrs, indicative that the GPS signal had been lost for the past 30 seconds. The reason for the loss of the GPS signal could not be fully established. However, as no external GPS antenna was fitted, it is most likely that the aircraft entered a series of

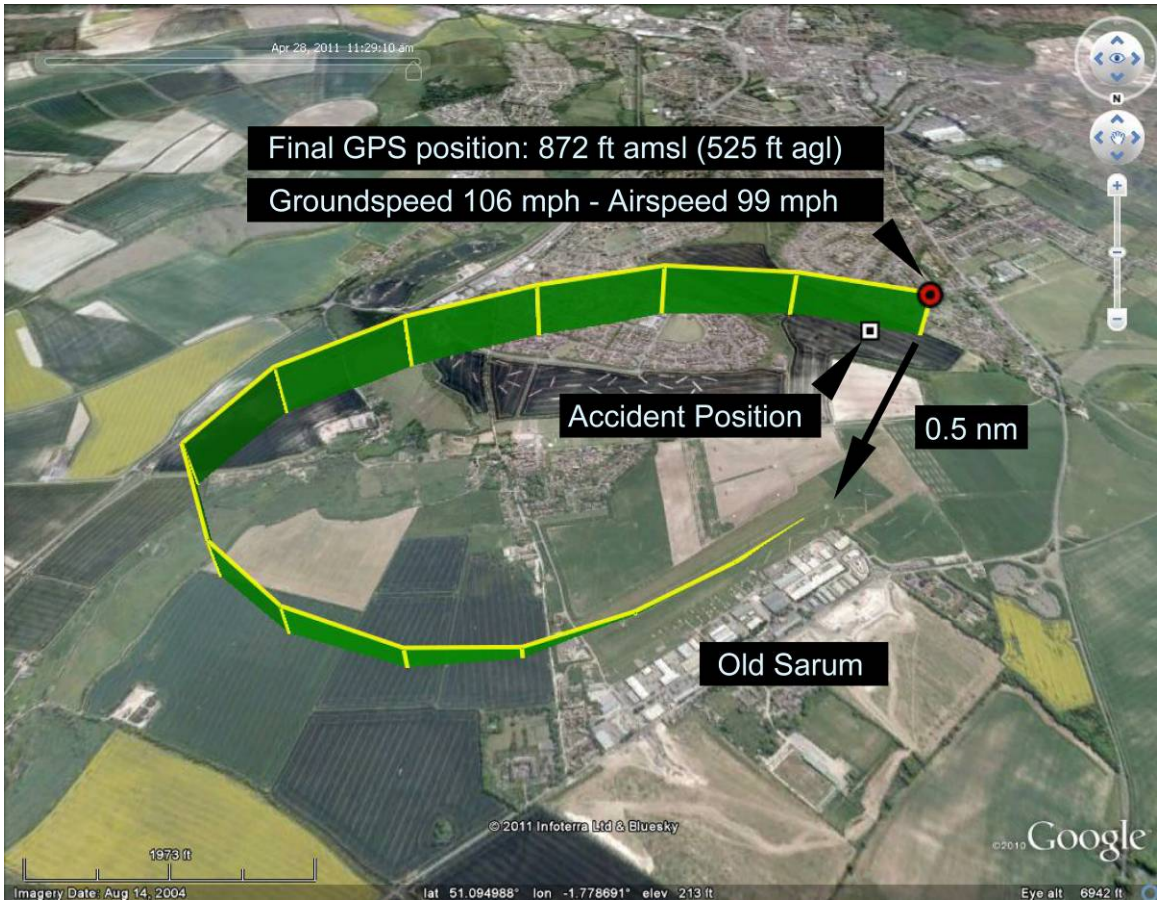

Figure 1

GPS Track from Old Sarum (view looking south)

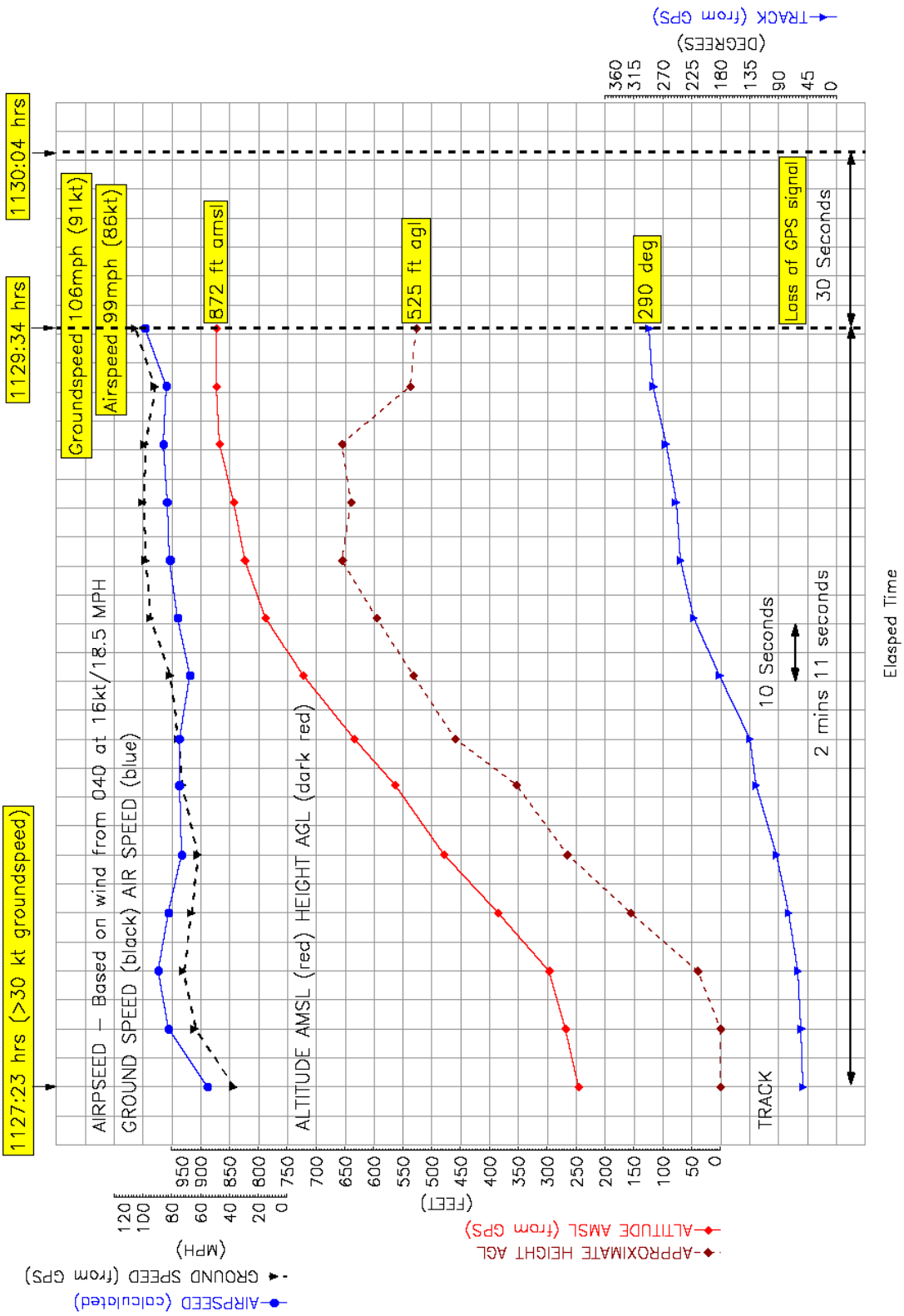

Figure 2

GPS Track points with derived airspeed

manoeuvres that resulted in the aircraft structure shielding the GPS unit from satellite signals. Further, it could not be established if the aircraft was still in flight when the track log stopped or if the unit had continued to operate after the aircraft had impacted the ground. Considering the impact forces though, it is likely that the track log was ended whilst the aircraft was still in flight.

Analysis of the data by the aircraft manufacturer indicated that the airspeeds and climb rate were consistent with maximum, or near to maximum, engine power having been selected throughout the period of the recorded data.

Aircraft information

The M24C (Orion) is a two seat, side-by-side, enclosed gyroplane powered by a 115 Hp Rotax 914 turbocharged piston engine. The aircraft is built around a steel keel and mast with the tail section, landing gear beam, 82 ltr fuel tank and rotor blades manufactured from glass fibre composite material. The cabin and door frames are manufactured from a carbon fibre composite. Both occupants are restrained by four-point harnesses and are provided with seat cushions made of energy-absorbing 35 mm CF-45 Dynaform. Ventilation of the cockpit is achieved on the ground by opening the doors and in flight by air passing through two air vents at the base of the windscreen and through a heating duct located behind the pilot's head.

A 'gull-wing' (upward opening) door is fitted to each side of the cockpit and is attached to the aircraft by a hinge fitted to the top edge of the door frame, see Figure 3. A strut is fitted to the rear of the door and holds the door open when the aircraft is on the ground; the strut also limits the upward movement of the door. The door is secured in the closed position in flight by two spigots mounted on the lower section of the door frame, which

Figure 3

Door arrangement

engage in locating blocks mounted on the inside of the door sills.

The spigots are locked in place by shoot bolts operated by the door lock levers. The bolts are in the unlatched position (open) when the internal lock lever is just aft of the vertical and in the latched position (closed) when the internal lock lever is in the forward, over-centred position, flush with the door sill, see Figure 4. A 'knob' on the lower part of the door frame allows the door to be held closed while the locking mechanism is engaged. While the doors may be open during taxi, the aircraft is not approved to fly with them in the open position.

With regard to the closing of the doors the flight manual states:

> *'Grab the frame of the door and lower it.*
>
> *Close the door pulling on the knob.*
>
> *Engage the pins of the locking system lowering the lock lever.*
>
> *Visually check that both pins (front and rear) have engaged securely.'*

The investigation determined that it requires two hands to close and lock the door. Moreover, it is not possible to check visually, while seated in the aircraft, that the rear spigot is latched in the locating block by the shoot bolt. The only way to check that the spigots are correctly engaged and latched is to push on the door.

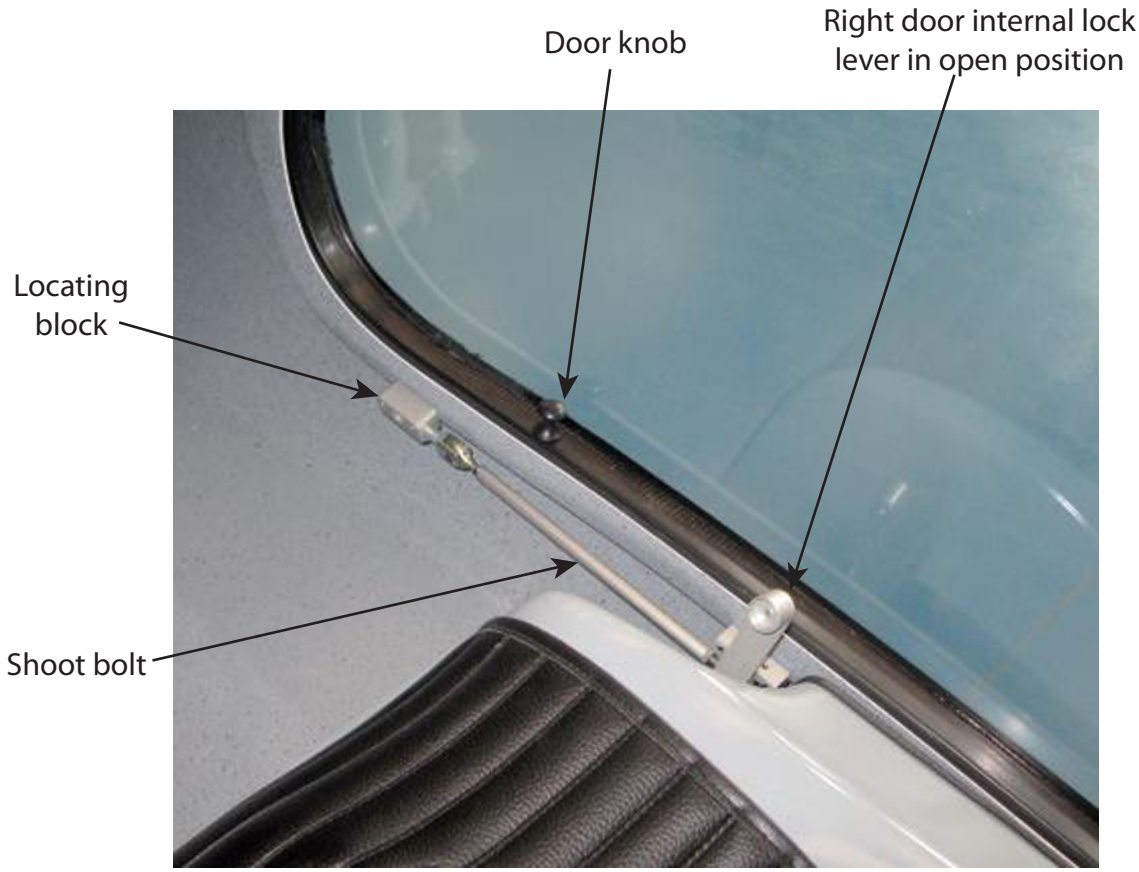

Figure 4

Right door operating mechanism

The internal locking lever on the left door is designed such that, when the locking lever is in the unlatched position, contact between the wheel brake operating lever and the internal locking lever limits the forward movement of the throttle lever, see Figure 5. On the aircraft examined by the AAIB, it was noted that with the relative positions of the levers shown in Figure 5, the shoot bolts prevent the spigots from fully engaging in the locating blocks. Thus, if an aircraft takes off with the door lock lever in the closed position, but the door spigots are not latched, the pilot would first have to close the throttle, at least partially, in order for the door lock lever to be moved rearwards a sufficient distance to allow the door to be closed and the spigots to engage fully in the locating blocks. The investigation also found that it is possible for the loose end of a lap strap to become trapped between the door sill and the door, preventing the rear spigot from entering its locating block.

Aircraft history

The Permit to Fly and Certificate of Validity for G-CGTI had been issued by the UK Civil Aviation Authority on the 20 December 2010. At the time of the accident the gyroplane had flown approximately 25 hours and had undergone a 25-hour maintenance check on the 20 April 2011, approximately one flying hour prior to the accident. There was no evidence of G-CGTI having had had any technical problems prior to the accident flight.

Previous occurrences of cockpit doors opening in flight

At the investigation's request, the aircraft manufacturer contacted their agents to determine if there had been occurrences of the cockpit doors on the M24 opening in flight. The manufacturer was advised of seven occasions and on six of these the door moved to the open position

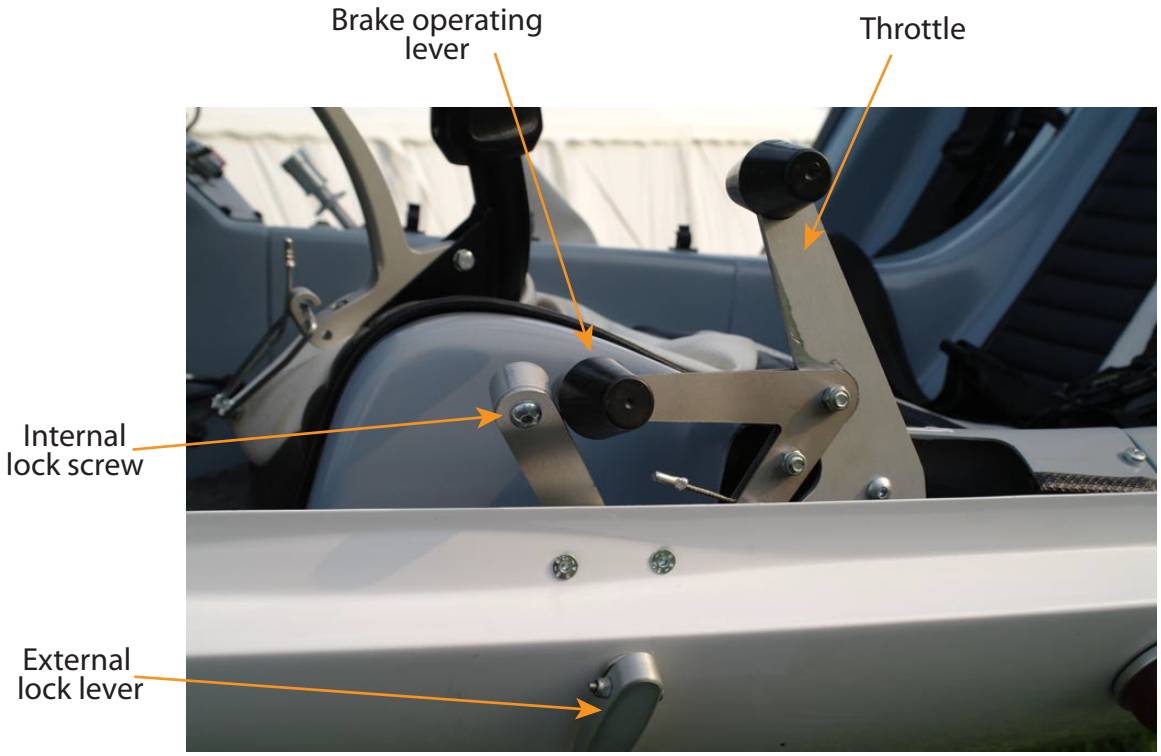

Figure 5

Throttle restricted by internal lock lever.

as the nose came up during takeoff. However, there were no reports of any of the pilots experiencing any adverse handling effects. A summary of the occurrences follows:

- The right hand door opened on a gyroplane operating in South Africa.

- There were five occurrences in France. Three occurred over a six-month period and involved the same student and the left door. The other two occurrences involved left and right doors on different aircraft, resulting in two cracks of approximately 6 and 23 cm developing in the transparency in the left door.

- There was one occurrence in Italy when approximately ¼ of the transparency broke away from the right door and struck two propeller blades causing superficial damage.

The investigation was also advised by an owner in the UK that on two occasions he had realised once airborne that the forward spigot was not locked in the locating block.

Crash site examination

The gyroplane crashed on a heading of 280°M in a large (130 m x 1 km) flat field, approximately 900 m, and 200°M, from the threshold of Runway 06 at Old Sarum. The aircraft was destroyed in the post-impact fire, which burnt out before the emergency services arrived on the scene. An area of grass 2 to 5 m around the crash site had also caught fire.

The wreckage trail extended for 13 m from the initial impact point on a heading of 280°M. The baggage compartment access door, left anti-collision light, part of the left door sill and the bottom rear corner of the left door were all found close to the initial impact point. The left main wheel and part of its axle, the strut, lock lever, one locating block and the shoot bolts from the left door were all found in the wreckage trail. The strut and locking lever from the right door were found with the main wreckage.

There were two main rotor strike marks in the ground adjacent to the initial impact point which, when compared with the other ground marks, indicates that the gyroplane crashed on its left side with the rotor disc angled rearwards by approximately 40°. The intensity of the fire was consistent with the fuel tank rupturing during the initial impact and spilling its contents along the wreckage trail. Photographs taken shortly after the accident, indicated that the fire in the main part of the wreckage was sustained by the burning of the resin in the composite materials.

Examination of the wreckage

The intensity of the fire destroyed most of the instruments and the composite structure and aluminium components. The GPS, which had been badly damaged in the impact, had been thrown forward of the main wreckage by approximately 3 m into the burning grass. Despite the extensive damage to the aircraft, it was possible to establish that, with the exception of the control columns that were destroyed in the fire, there was control continuity from the cockpit to the rotor head and rudder. The throttle cables were also still attached to the carburettors, which had melted in the fire. There was no evidence of any pre-impact damage to either the propeller or main rotor blades. The rudder remained attached to the keel and the remainder of the empennage broke off in two parts early in the accident sequence. The fin, right horizontal stabilizer and winglet had been badly damaged by the fire, whereas the left horizontal

stabilizer and winglet had been thrown outside the burning area and were relatively undamaged.

The beams supporting the pilot's side of the seat had been bent rearwards and the rotor mast was bent to the right. The buckles on each of the four-point harnesses were connected and in the locked position and all the seat harness attachment fittings were still attached to the aircraft structure. The nosewheel fork had failed, consistent with a force from the left side. The left main wheel and axle had detached from the aircraft and damage to the outer flange on the left hub was consistent with a force from the left side of the gyroplane. The landing gear beam had failed where it attached to the left side of the aircraft.

The majority of the door frames and the transparency in the windscreen and doors had been destroyed in the post-impact fire. Nevertheless, parts of the right door frame, strut, locking lever, both spigots and one locating block from the right door sill were recovered from the main wreckage. The bottom rear corner of the left door, which was relatively undamaged, and the strut, locking lever, shoot bolts, rear spigot, one locating block and part of the left door frame were found in the wreckage trail.

As far as could be established, there was no evidence of any pre-impact damage to the gyroplane, which appeared to have been correctly assembled and maintained.

Certification

Production of the M24 gyroplane commenced in Italy in May 2008 and at the time of the accident over 70 had been delivered with 11, of the M24C variant, on the UK register.

The M24C gyroplane is Type Approved by the UK CAA to CAP 643, British Civil Airworthiness Requirements (BCAR) Section T, Light Gyroplanes. The Airworthiness Approval Note for the M24C was issued on 4 October 2010, which allows a Permit to Fly to be issued to each aircraft that meets the requirements of the Type Approval.

CAP 643, BCAR Section T (Light Gyroplanes) has been based on CAP 482, BCAR Section S (Small Light Aeroplanes), which is applicable to microlight aeroplanes, and is intended to reflect a similar level of airworthiness. Where appropriate, requirements in BCAR Section T have been included from EASA CS 27 (Light Rotorcraft).

Compliance with BCAR Section T

The investigation reviewed BCAR Section T and the compliance document with regard to the handling qualities and the security of the cockpit doors on the M24C.

Handling qualities

- The gyroplane had been tested by the CAA flight test department, with both doors fitted and correctly latched in the closed position, and was found to have acceptable handling characteristics and could be safely controlled during any manoeuvre with normal piloting skills.
- The M24 and M24C had not been flight tested by either the manufacturer or the CAA with the doors in the open position and neither variant is approved to fly in this condition.
- BCAR Section T provides no requirement concerning handling qualities of the gyroplane when flown with the doors in the open position.

Cockpit doors

- There is no requirement in BCAR Section T, regarding the securing of the doors, or a requirement to ensure that doors can be safely closed in flight.
- There is no evidence in the compliance document that the doors are strong enough for the M24C to be flown with them in the open position. The manufacturer confirmed that such information is not available.
- The only reference in BCAR Section T concerning the doors is that the cockpit must be so designed as to provide occupants with unimpeded and rapid escape in an emergency, which is achieved on the M24C by a simple-to-operate door locking mechanism.

The AAIB could identify no requirements in BCAR Section S, BCAR Section T or CS27 regarding the safe operation of the aircraft when a door opens in flight. Given that, if not correctly latched, gull-wing (upward opening) doors can open in flight and present a potential risk to the handling and structural integrity of the aircraft, a Safety Recommendation is made to the CAA at the end of this report.

Flight observations

The AAIB conducted a series of flights in a Magni M24C, during which it was noted that the ground cockpit ventilation is relatively poor and in strong sunlight, with the door closed, the cockpit can heat up very quickly. While the checklist calls for the doors to be latched before taxiing, it is normal practice on sunny days, to taxi with at least one of the doors unlatched in order to improve ventilation and to close and latch the door during the pre-takeoff checks. To this end, the flight manual contains the advice that:

> *'In high ambient temperatures it is possible to taxi with the doors open. In this case slow taxiing is recommended to avoid stress on the door attachment points.'*

At the time of the accident, the checklist that the pilot was using did not refer to the doors in the 'pre-takeoff' checks.

During training, pilots are encouraged to check that the aircraft is flying 'in trim' by releasing the control column for short periods of time. With two people onboard, and the aircraft correctly trimmed, the investigation observed that the aircraft attitude does not change significantly when the control column is released However, it was noted that when flying solo from the left seat there was a slight tendency for the aircraft to roll to the left when the control column was released in flight. It was also observed that if the power was reduced quickly, whilst the control column was not being held, then the aircraft tended to roll rapidly to the left. This roll to the left was quickly and easily corrected by the pilot once he took hold of the control column.

Analysis

General

The investigation established that the gyroplane had been recently serviced and had no recent fault history. There was no evidence of any pre-impact damage to the propeller or main rotor blades, or of disconnection of the engine or flying controls. There was no evidence of any structural failure in the air, although the degraded state of the wreckage meant that the possibility of in-flight damage to a door could not be entirely eliminated.

The ground marks and damage to the aircraft indicated that it landed heavily on its left side on a heading of 280°M and was destroyed in a post-impact fire. At the time of the accident the pilot was secured by a four-point harness and as far as could be established both doors, their fittings and locking mechanisms were still attached to the aircraft.

Door security

The left aircraft door was observed to be closed when the aircraft started its takeoff run, but shortly after it rotated the door was seen to be open; the pilot also reported on the radio that he had a problem with his door. The investigation determined that it is not possible to open the throttle fully with the door lock lever in the open position; however from the speeds obtained from the GPS it is apparent that during this period the engine was probably at maximum power. Therefore the lock lever must have been in the closed position. If the door lock lever was in the closed position with either of the door spigots engaged, and latched, then it is unlikely that the door would have opened in flight. As the door was seen to be open in flight, and the aircraft performance indicates that the engine was at maximum power, then the door lock lever must have been in the closed position, but with neither of the two door spigots latched.

It is normal practice, on a hot day, to taxi with a door on the M24C open and to close and latch it during the pre-takeoff checks. The door was seen to be closed at the start of the takeoff run, which suggests that the pilot had closed the door and believed that it was correctly latched. However, from the previous seven occurrences of doors opening in flight it is known that pilots can take off with the doors closed in the mistaken belief that they are correctly latched. Tests carried out by the AAIB confirm that with the door lock lever in the closed position, the door can visually appear to be closed without either spigot being correctly latched. On this occasion the direction of the relative wind at the holding point would have assisted in holding the door in the closed position, thereby reducing the likelihood that the pilot would notice a gap between the door frame and sill, which might have alerted him that the door was not secure.

Aircraft handling

The door opened about the time the aircraft became airborne and it was then seen to roll and yaw in an unusual fashion. Thereafter the aircraft appeared to fly normally until the end of the downwind leg. Previous experience suggests that the door opening in flight should not have adversely affected the handling of the aircraft and there is no evidence that the door broke away and caused damage that would have affected the control of the aircraft.

To latch the door in flight, the pilot would first have to retard the throttle to enable the door lock lever to be moved sufficiently aft in order to withdraw the shoot bolts from the locating blocks. The data from the GPS suggests that the engine power remained at the takeoff setting for most of the flight; therefore the throttle must have remained well forward.

It is not possible, in flight, to close and lock the door with one hand. Given that witnesses who observed the last part of the flight did not see the door open, and there was no apparent reduction in engine power until the end of the flight, it is likely that the pilot continued to fly the aircraft with one hand holding the door closed and the other hand on the control column. At the end of the downwind leg, the pilot would normally reduce the engine power in order to descend and it is possible, given the witnesses reports of unstable flight, that at this point the pilot was experimenting with letting go of the control column, perhaps to reduce the engine power or latch the door.

Latter stages of flight

The pilot of the aircraft joining the circuit at base leg and the witnesses near the accident site all described the aircraft as making an into-wind approach to the field where the aircraft ultimately crashed. While the investigation could not determine why the pilot would elect to land in a field when the airfield was so close, the field was considered to be suitable for a forced landing.

Having positioned the aircraft over the field, the pilot would normally close the throttle in order to land. This is consistent with witness reports that there was a marked reduction in the engine noise just prior to the accident. In order to close the throttle the pilot would have had two options: let go of the door or let go of the control column. However, there was no advice in the aircraft flight manual regarding flying with the door open and the pilot may have been concerned about possible damage to the aircraft or adverse handling characteristics if he let go of the door.

The throttle is relatively near the control column and from his conversion training he would have been shown that the aircraft attitude does not change significantly when the control column is released, providing the aircraft is flown in trim. He was probably unaware that the rapid closure of the throttle from takeoff to idle power setting, while not holding the control column, causes the aircraft to roll to the left.

Had the pilot released the control column and rapidly closed the throttle lever while continuing to hold the door, then a sudden roll to the left may have taken him by surprise. Close to the ground there would not have been sufficient time for him to recover the situation.

Conclusion

The investigation concluded that while the pilot's door appeared closed, it had not been correctly latched and as a consequence opened as the gyroplane took off. The throttle remained at the takeoff power setting for most of the flight and it is probable that the pilot held the door closed with one hand whilst flying the aircraft with his other hand. Evidence suggests that the pilot was attempting to land in a field at the end of the downwind leg. Reports of a reduction in engine noise and the sudden rolling of the gyroplane to the left are consistent with the pilot releasing the control column and rapidly closing the throttle. The pilot would not have expected the aircraft to roll to the left and at low level there would have been insufficient height to recover the situation.

Safety actions

As a result of the findings from this investigation, the following safety actions have been initiated by the CAA and the manufacturer:

- A Service Information Leaflet (SIL-001-2011 dated 19 May 2011) was sent by Magni Gyro UK to all owners and operators of the M24C on 23 May 2011 highlighting the importance of performing checks on the security of the door latching prior to commencing the takeoff. It also stated that a door opening in flight is unlikely to become detached or adversely affect the aircraft's handling and recommended that in such an event the airspeed should be limited to around 50-60 mph and the aircraft landed in an unhurried and controlled fashion as soon as possible.

- A revision to the Flight Manual was issued on 18 May 2011 (Issue E) and the CAA approved the change in the M24C Type Approved Date Sheet on 19 May 2011 (Issue 3) to include the following warning:

> *'WARNING: DANGER*
>
> *It is imperative that the security of the door latching is checked prior to take-off as the door may come open on take-off, if incorrectly latched. After engaging the latching lever both the pilot's and passengers doors should be pushed from inside the cabin to ensure both forward and aft catches are secure. Should the door come open in flight it is unlikely to become detached or adversely affect the aircraft's handling. However should a door open in flight it is recommended that the airspeed be limited to around 50-60 MPH and the aircraft landed in an unhurried and controlled fashion as soon as is possible.'*

- Magni Gyro Ltd have discussed with the CAA, and intend to implement, a number of design changes to improve pilot awareness of the status of the latching mechanism. These include: microswitches to confirm the position of the aft door locking pin and shoot bolt, a red warning light to warn if a door is not correctly latched and a change to the digital rotor rpm gauge so that the display will be blanked if a door is not latched correctly.

Safety Recommendation

If not correctly latched, gull-wing (upward opening) doors can open in flight and present a potential risk to the handling and structural integrity of the aircraft. There is currently no guidance in BCAR Section T concerning the risks associated with doors opening in flight. Therefore, the following Safety Recommendation is made:

Safety Recommendation 2011-082

It is recommended that the Civil Aviation Authority amend the requirements of BCAR Section T, to minimise the likelihood of an aircraft door inadvertently opening in flight.