

DATA SUMMARY

LOCATION

Date and time	Wednesday, 24th Sept. 2003; 13:20 h local time
Site	1 NM to the south of Porto Petro (Balearic Islands)

AIRCRAFT

Registration	G-STRO
Type and model	ROBINSON R22 Mariner II
Operator	Sloane Helicopter Limited

Engines

Type and model	LYCOMING O-360-J2A
Number	L.38305-36A

Crew

Pilot in command

Age	39
Licence	ATPL(H)
Total flight hours	2,923.35 h
Flight hours on the type	2,148.05 h

INJURIES

	Fatal	Serious	Minor/None
Crew			2
Passengers			
Third persons			

DAMAGES

Aircraft	Important
Third parties	None

FLIGHT DATA

Operation	General aviation – Aerial work – Commercial – Photography
Phase of flight	Maneuvering – Flying at a low altitude

REPORT

Date of approval	25th April 2006
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1. FACTUAL INFORMATION

1.1. History of the flight

The crew was carrying out a photographic flight at a low height, taking photographs of boats navigating close to the coastline.

The helicopter was equipped with a system of inflated floats along its skis and was flying with the left-hand door off to facilitate the taking of photographs. The pilot and the person taking the photographs were on board the helicopter.

After photographing the stern of a sailing boat for approximately one minute, the helicopter was commencing the acceleration manoeuvre for its ascent when one of the helicopter's skis touched the water, causing the helicopter to fall onto the surface and tip over, with the cabin being submerged in the water. The two occupants escaped from the helicopter and rose to the surface, being rescued by the same boat which they had been photographing.



Site of the accident

1.2. Damage to the aircraft

The aircraft suffered considerable damage, the most important aspects of which are listed below:



- The main rotor's blades struck the tailboom, cutting it and the power transmission axis to the tail rotor.
- The main rotor head assembly and the blades were bent.
- The float installed on the left ski was damaged.
- Beginnings of corrosion due to immersion in sea water.

The aircraft tipped up, with the cockpit and main rotor assembly in the water, floating on the water's surface due to the effect of one of the two floats.

The instruments did not provide significant data on the accident, with the exception of the altimeter radio in which the pilot had selected a decision height of 10 ft, at which an acoustic and luminous alarm would be activated.

1.3. Personnel and aircraft information

1.3.1. Pilot

The pilot was in possession of an Airline Transport Pilot License (Helicopter) (ATPL(H)) and Type R22 rating, which was valid up to 8th October 2003.

The person seated in the left seat of the helicopter had been acting as photographer for the operator for three months.

1.3.1. *Aircraft airworthiness and maintenance*

The aircraft had been awarded an airworthiness certificate issued by the Civil Aviation Authority (CAA) of the United Kingdom, valid up to 10th October 2004.

Second-level maintenance was carried out in a JAR-145 workshop located at Sabadell airport.

1.4. **Meteorological information**

The meteorological information provided by the pilot was north-east winds with a speed of 10 kt, good visibility and an ambient temperature of 26 °C.

1.5. **Survival**

The photographer was helped by the pilot to release her safety belt. Once on the sea's surface they saw the boat they had been photographing and swam towards it. This boat picked them up and transferred them to Cala D'or marina.

The flight plan form did not indicate the existence of life jackets on board.

1.6. **Additional information**

1.6.1. *Photographical equipment*

The digital camera used on this flight was a Nikon model Coolpix 5700 with an 8x optical zoom. No anti-vibration platform was being used.

1.6.2. *Operational rules for helicopters*

In OACI Annex 6, Part III, international operations for helicopters it is established in paragraph 4.5.2.2 that performance Class 3 helicopters, like this one, when operating beyond autorotational distance from land shall be equipped with one life jacket, or equivalent individual flotation device for each person on board.

On the other hand, rules of the operator's state («Rules of the Air Regulations 1996», UK) determine the conditions to allow the operators intending to fly by keeping distances below 500 feet with respect to objects such as boats. Also they establish the requirement for all occupants of the helicopter to both wear life jackets and for them to have been trained in their use.

1.7. Tests and research

1.7.1. *Pilot's statement*

In accordance with the information provided by the pilot in his statements, the target of the last photographs was the sailing boat's stern which is why the helicopter was flying behind the boat, at a distance of 150 m and at a height of 2 m above the water. So as to provide a good angle for the photographs, the pilot had been flying the helicopter out of trim (with the right pedal pressed) for some thirty seconds. Once the photographs had been taken, he pressed the pedals to compensate the helicopter, which moved to the right of the boat's wake, with a headwind. During the initial acceleration for the ascent, the aircraft lowered its nose and immediately tipped forward, becoming submerged. Both crew abandoned the aircraft and were rescued by the boat. The pilot also stated that he helped the photographer to unfasten her seat belt and escape through the door.

In a later statement the pilot indicated that both occupants were wearing the life jackets and also that they have reminded the emergency procedures before initiating the flight.

1.7.2. *Photographer's statement*

Whilst taking photographs of a boat which was navigating in the area, the helicopter fell into the water as a result of a wave striking one of its skis.

After the impact and the helicopter tipping over she was assisted by the pilot to escape from the helicopter because she was wearing a safety belt.

1.7.3. *Statement of witnesses*

The captain of the boat which was being photographed stated that his boat was navigating at an approximate speed of 20 kt and that the helicopter was carrying out maneuvers at a distance of some 25 metres and for some five minutes.

The helicopter was situated behind the boat and flew at less than a meter and a half above the water for approximately one minute.

Whilst the helicopter was carrying out its exit procedure, always with the boat navigating at 20 kt, the helicopter's right ski was struck by a wave which caused the helicopter to fall into the water and then tip forwards.

None of the testimonies collected during the subsequent moments to the event mentioned the presence of the life jackets on the pilot or on the photographer.

1.7.4. *Flight manual*

A safety note in the Flight Manual of the Mariner model states that the flying and control characteristics of a helicopter with floats is more critical than in the case of helicopters with a conventional undercarriage. For example, helicopters with floats have an adverse rolling characteristic: when the nose yaws to the right or left, the helicopter tends to roll in the opposite direction to the turn.

2. ANALYSIS

2.1. Analysis of the operation

The aircraft was flying at an approximate speed of 20 kt and out of trim because of the pilot's greater actuation on the right pedal, so as to turn the nose to the right and allow the photographer to have a better angle for taking photographs. In this type of helicopter, the right pedal's activation results in a reduction in the tail rotor blades' angle of attack.

Once the photographs of the boat's stern had been completed, the pilot applied left pedal so as to compensate the helicopter in its flight. Activation of the left pedal results in the opening of a larger angle of attack in the tail rotor blades and consequently a greater use of power by this rotor, which causes the helicopter to lose height.

The pilot initiated acceleration so as to increase the speed to the 25 or 30 kt indicated; for this he would apply forward cyclic. At that moment it left the boat's wake and moved into waters with a surface without references.

Whilst the helicopter was flying at 20 kt and out of trim on its right pedal, the pilot would have adjusted power to maintain these flying conditions at a height above the water of not more than two metres for a period of 30 seconds.

Once the photographs of the boat's stern had been completed, the helicopter's compensation manoeuvre, applying left pedal, could have made the helicopter lose height if not corrected by the pilot in time resulting in the aircraft rolling to the right side of its longitudinal axis. At the same time, the application of forward cyclic would also make the aircraft lose height.

The sum of the effects of both actions on the helicopter may have resulted in the aircraft's larger descent, which maybe was not sufficiently corrected by the pilot.

The distance between the helicopter and the boat may have been closer to that specified by the boat's captain, in the region of 25 metres, due to the fact that the camera at that distance could have operated without activating the zoom or with mini-

mum aperture. The photographer was working without an anti-vibration platform and, consequently, a greater distance from the helicopter to the boat would require larger zoom aperture, a measure which is not advisable because of the helicopter's vibrations.

In the acceleration phase, the helicopter passed from flying over an area with a rough surface, such as the boat's wake, which could provide height references to the pilot, to an almost waveless sea surface, which would not provide height references to the pilot.

2.2. Survival aspects

2.2.1. *Life jackets*

The information gathered concerning whether life jackets were used or not by the occupants of the helicopter is contradictory. There are reasonable doubts to think that these equipments were not on board, so therefore they could not be used. It would be convenient to ensure that in the operations of helicopters with these characteristics there are available means to improve the survival in case of water ditching.

The tipping over of the helicopter on the water and its immediate immersion could have caused spatial disorientation in the occupants, with them mistaking their position in the water and swimming towards the bottom. The use of life jackets would avoid this problem as they tend to carry a submerged person to the water's surface.

In order to facilitate the use of life jackets continuously in prolonged flights, according to what is specified in the regulations, it would be convenient that these life jackets or the equivalent floating device were of a suitable lightweight and of comfortable nature, more akin to sailing type lifejackets.

2.2.2. *Emergency training and drills*

The photographer indicated that she was helped by the pilot because she was wearing a safety belt. This information was also stressed by the pilot.

All persons carrying out tasks on board a helicopter must be able to evacuate the helicopter by themselves and, if necessary, collaborate in assisting the helicopter's other occupants.

In order to achieve this degree of autonomy in all crew members, regardless of whether they are performing flying or other tasks on board the helicopter, emergency training and drills are necessary.

3. CONCLUSIONS

The helicopter's successive loss of height due to different actions on the helicopter's controls, as analyzed in point 2.1, application of insufficient power to correct this loss and the possible erroneous interpretation of the helicopter's height above the water on the pilot's part could have caused the helicopter's descent and subsequent impact with the water resulting in it overturning.