CIAIAC
Comisión de Investigación
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TECHNICAL REPORT
A-045/2003

Accident to aircraft ROBIN, model ATL «Club», registration F-GFNB, in the vicinity of the Rinlo coastline (Lugo), on 8 August 2003

MINISTERIO
DE FOMENTO

Technical report

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Foreword

This report is a technical document that reflects the point of view of the Civil Aviation Accident and Incident Investigation Commission (CIAIAC) regarding the circumstances of the accident and its causes and consequences.

In accordance with the provisions of Law 21/2003 and Annex 13 to the Convention on International Civil Aviation, the investigation has exclusively a technical nature, without having been targeted at the declaration or assignment of blame or liability. The investigation has been carried out without having necessarily used legal evidence procedures and with no other basic aim than preventing future accidents.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report has originally been issued in Spanish language. This English translation is provided for information purposes only.

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Abbreviations

00 °C	Degrees centigrade
cm	Centimeter(s)
dd-mm-aaaa	Date (day, month and year)
GPS	Global Positioning System
h	Hour(s)
hh:mm	Hours and minutes
HP	Horse Power
hPa	Hectopascal(s)
INM	National Meteorological Institute
kg	Kilogram(s)
km	Kilometre(s)
km/h	Kilometre(s) per hour
kt	Knot(s)
kw	Kilowatt(s)
LEST	Santiago de Compostela Airport
LEVF	Villaframil-Ribadeo Aerodrome
m	Metre(s)
m^2	Square metre(s)
min	Minute(s)
MTOW	Maximum Take off Weight (Certified)
N	North
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Onmidirectional Range
W	West

Synopsis

Owner and Operator:	Same person, private
Aircraft:	Robin, model ATL «Club»
Date of the accident:	8 August 2003
Time of the accident:	Approximately at 12:50 h[1]
Place of the accident:	During initial climb from Villaframil aerodrome (Lugo), the aircraft fell into the sea, near the coastline in the town of Rinlo, province of Lugo
People on board:	Two, the pilot and a passenger. Both were killed in the accident
Type of flight:	General aviation, pleasure

Accident summary

Stalled during initial climb, with possible spatial disorientation due to flight in thick fog.

[1] The time reference used in this report is local time. To obtain UTC time, it is necessary to substract 2 hours.

1. FACTUAL INFORMATION

1.1. History of the flight

The two aircraft occupants were on a sightseeing trip that was scheduled in several legs and that started three days before the accident occurred in the Santander airport, from which Aero Club the pilot was a member. The aircraft was based at this airport.

The trip started on August the 5th, flying to Asturias airport, as confirmed in the corresponding flight plan. That same day the pilot attempted to fly to the Villaframil- Ribadeo aerodrome, in the Lugo province, but he had to go back after taking off due to the adverse meteorological conditions encountered en-route. This leg was flown the next day, and touchdown at destination was notified at 12:26 h.

It was a light single engine aeroplane, manufactured by Robin, model ATL, type «Club», with registration marks F-GFNB, owned by the pilot who was on board together with a passenger.

The accident flight, on 8 August 2003, departed Villaframil-Ribadeo aerodrome (LEVF) and its intended destination was Santiago airport (LEST).

According the comments made by a witness who spoke with the pilot, the pilot told him he had filed via telephone the flight plan to the destination airport, confirming estimated take off time at 11:30 h and estimated flight time of 1 h and 10 min. The flight plan, originated at Santiago airport (LEST), confirms this data. Actual take off time was a little after 12:30 h, based on the statements of all people who witnessed the aircraft first moments of flight.

The meteorological conditions existing at the aerodrome the day of the flight were calm atmosphere with no high clouds present and low and heavy fog that limited the visibility, mainly horizontally. Based on witnesses statements, at the time of the flight, the sun was visible and fog was heavier over the sea, resulting on a visibility between 200 and 300 m.

The pilot decided to fly the leg in those conditions, expecting that the weather would be clear above the fog layer. He commented that he had previously been informed that VFR conditions were forecast at the destination airport.

The accident occurred during the initial climb after take off. The aircraft took off from runway 08, heading towards Ribadeo. Some witnesses saw the aircraft turning towards the sea, were the fog was heavier, during the initial part of the climb and quickly went out of sight.

Figure A-1 of Appendix A contains a map of the accident zone.

During the duration of the flight, no communication or aircraft signal was received and nobody witnessed the accident. Several people, employed on beach cleaning and other tasks in the proximities, have declared they heard the engine noise, continuous and steady until the aircraft hit the sea surface. Some of these people have indicated it seemed like the aircraft was returning to the aerodrome since the engine noise was louder from certain moment.

Search and Rescue Services were alerted by some of these people after hearing the crash noise, and shortly after they located and recovered part of the wreckage that was floating on the sea, including the corpses of both occupants. The first alert call was made at 13:00 h.

The wreckage was found at a distance between 300 and 400 m from the coastline, where the depth was greater than 10 m. The coordinates of the location were 043° 33.500 N/007° 03.900 W, as reported by the ship that found the wreckage, which arrived 55 min after the accident.

1.2. Injuries to persons

Injuries	Fatal	Serious	Minor/none
Crew	1		
Passengers	1		
Others			

1.3. Damage to aircraft

Based on the recovered remains that were found floating in the sea, it can be concluded that the aircraft was totally destroyed on the impact against the sea surface.

The remains were basically a wing, the stabilizer and seat fragments, a bag with some belongings, a wheel and the occupant corpses.

Other aircraft remains could not even be located, in spite of the search carried out with divers that lasted until August the 18th, ten days after the accident. Sea waters are much deeper in the site surroundings; there is also a lot of marine currents in the area and abundant vegetation in the sea bed.

1.4. Other damage

No additional damage was caused.

1.5. Personnel information

1.5.1. *Pilot*

Age:	43 years old
Nationality:	Spanish
Title:	Private Pilot Aeroplane
Ratings:	— VFR-HJ (VFR flights, daytime) — Single Engine piston (land)
Date of issue:	25-09-2002
Date of validity:	25-09-2004
Medical certificate:	— Date of issue: 12-02-2003 — Date of validity: 15-02-2005
Total flight time:	Based on the information provided by the pilot in his conversations with the aerodrome staff the day of arrival, he had a total flight time of 120 h. Half of this time corresponded to the private pilot course. The rest was flown in the crashed aircraft, half of it with an instructor, for the check out on this type of aircraft

1.6. Aircraft information

The aircraft type ATL («Avion Très Léger»: Very Light Aeroplane), model «Club», registration mark F-GFNB is a single engine aeroplane belonging to the «Very Light Aircraft» (VLA), category with an empty weight of 360 kg, manufactured in France by the Robin company.

It is a 5° sweptback mid wing, V-tail, tricycle fixed landing gear, two seat and full dual flight controls aeroplane. The fuselage is built with composite material, and the wings and the empennage are made of a wooden structure covered with polyester fabric, used with this purpose and known commercially as «Dracon». The control surfaces are made of light alloy. The aircraft power plant consists of a two blade propeller and a horizontally-opposed four cylinder engine. In its basic configuration, the aircraft is not equipped with an attitude indicator.

The prototype first flight was on 17 June 1983 and the model was manufactured until the end of 1990.

The aircraft with registration F-GFNB was the first of the 36 manufactured prior to obtaining the final certification in April, 1986. Meanwhile, the aircraft flew with temporary certification and registration marks F-WFNB.

Its main characteristics, for information purposes, are:

— Wingspan: 10.30 m
— Length: 6.70 m
— Height: 2.0 m
— Wing area: 12.20 m^2
— Empty weight: 360 kg
— Maximum Baggage Weight: 10 kg
— Service Ceiling: 3,960 m
— Cruise Speed: 142 km/h
— Stall Speed: 75 km/h (flaps extended)
— Maximum Range: 790 km

1.6.1. *Aircraft*

Make:	Robin
Model:	ATL «Club»
Manufacturing number:	01
Registration marks:	F-GFNB
MTOW:	580 kg
Owner:	Private
Operator:	Private

1.6.2. *Airworthiness certificate*

Number:	109176
Category:	Special
Date of issue:	22-05-1986
Date of renewal:	27-05-2003
Expiration date:	27-11-2003

The aircraft Airworthiness Certificate is associated to it's own weight and balance report and to a note issued by the French «Direction Générale de l'Aviation Civile», dated 18 October 2001, which indicates «even though the aircraft does not completely comply with the current regulations, it complies with a series of conditions, based on the regulations FAR-23, Amendment 1 to 28, considered sufficient to comply with the regulations included in paragraph 2.2 of the Annex 8, part 2, of the Chicago Convention».

1.6.3. *Maintenance log*

Total flight time:	1,957:15 h by 20-05-2003
Last 2,000 h/6 years inspection:	19-09-2001
Last 2,000 h/6 year inspection:	1,903:15 h
Last 50 h/12 month inspection:	12-12-2002 with 1,930:40 h
Last 25 h/12 month inspection:	20-05-2003 with 1,957:15 h

The information available indicated the aircraft maintenance was made in a French maintenance facility and usually based on periods of time rather than flight hours.

1.6.4. *Engine*

Make:	JPX
Model:	4T-60A
Power:	48 kw (65 HP)
Serial number:	Unknown
Last inspection:	19-09-2001. In this date the aircraft underwent its last major inspection. It is unknown if the inspection included power plant and other systems

1.7. Meteorological information

Based on the weather information provided by the National Meteorology Institute (INM), the existing conditions in the area at 14:00 h were:

— At surface, there was a weak isobaric gradient in the NW of the peninsula, with light and variable winds from 0 to 5 kt, prevailing Easterly direction. The temperature was very high.
— In the accident site, based on the 14:00 h observation in La Coruña and the analysis of that time, the most probable weather conditions at low levels were: geopotential height of 1,000 hPa and temperature of 20.6 °C at an altitude of 125 m with Easterly winds of 4 kt, and geopotential height of 975 hPa, temperature of 30 °C and North-easterly winds of 5 kt at an altitude of 400 m.
— During the morning hours, persistent fog was observed in Lugo, from Estaca de Vares to the boundary with Asturias province, including the site and the time of the accident.

— El National Forecast Centre predicted for that day the existence of local fog and mist in the Galicia coastline with visibility between 1,000 and 1,500 m, as significant weather forecast between 11:00 and 14:00 h.

1.8. Aids to navigation

Based on available information, the aircraft had installed GPS and VOR equipment.

The aircraft did not have an artificial horizon on board.

1.9. Communications

The aircraft was equipped with a 7 watts VHF two way radio communication device.

This equipment was not used at any time during that flight.

1.10. Aerodrome information

Although the aerodrome had no influence on the accident, the airfield most representative data are included for information purposes.

The Villaframil aerodrome, with the designator LEVF, is located in the vicinity of Ribadeo (Lugo), geographic coordinates 43° 33′ 09″ N/7° 5′ 16″ W and an elevation of 24 m.

El aerodrome has one 600 m long and 8 m wide asphalt runway with 08/26 orientation.

The aerodrome is privately owned and for pleasure general aviation use. The operation services are provided by the Santiago de Compostela (LEST) airport office.

1.11. Flight recorders

The aircraft did not have either a fight data recorder or a cockpit voice recorder since this kind of equipment is not required for its type.

1.12. Wreckage and impact information

As previously mentioned, only part of the wreckage and the two occupant bodies had been recovered. The two corpses were found outside the aircraft, floating in the sea and united by the passenger headset cable. The pilot was not wearing the headsets.

The rest of the wreckage have not been located, in spite of the divers search for several days, as mentioned abover.

The located part of the wreckage was recovered by a ship on the same day of the accident, in a place near the impact site.

Aside form the corpses, the most significant remains recovered, all of them badly damaged, were two stabilizers (figure B-1, Appendix B), the left wing (figure B-2, Appendix B), broken at approximately 60 cm from the tip, fragments of the seats, a bag with several objects and a wheel.

All parts of the wreckage were found in a 100 m radius.

1.13. Medical and pathological information

The results of the autopsy practiced to the two occupants indicate that both suffered injuries and diverse traumatisms distributed all over the body, including cranial traumatism. Particularly the passenger presented open fractures in the lower extremities.

According to the forensic opinion, in both cases the most probable etiology of the death is the accidental, being the immediate cause a cardio-respiratory stop and the fundamental cause the asphyxiation by immersion.

This opinion concludes that, considering the specified cranial traumatism, it is most probable that at the time they fell into the water, both occupants were unconscious or semiconscious with no ability to react, for which they passed away by immersion.

The toxicological examinations practiced show negative results for both occupants.

1.14. Fire

As it has been indicated, the impact occurred in the sea and no fire resulted in the accident.

1.15. Survival aspects

It is difficult to establish the chances of survival after the impact against the sea, since the aircraft attitude, the impact path and speed, the behaviour the windshield had at the time of the impact and the cabin transparencies (considering its size) cannot be determined.

On the other hand, any chance of survival at impact, like it really occurred, vanished since the accident was in the sea and the remains were located 55 min after the impact.

1.16. Tests and research

1.16.1. *Statements of witnesses about the accident*

As it was said above, there was no eyewitness of the accident, due mainly to the existing fog. Nevertheless during the investigation, several people who either saw the aircraft in flight, heard the impact against the sea or helped in the pre-flight tasks, were contacted.

From all the gathered comments, the following are the most relevant:

— Everybody agrees in the existence in the area of heavy fog at the surface, especially over the sea. One witness specifies that at altitude, the sun was visible. Another witness estimates that visibility over the sea was less than 300 m.
— People who were cleaning the beach, 500 m away from the departure end of the runway, estimate that the aircraft flew over them at very low altitude, compared to other aircraft that took off on the previous days.
— Some of the people who made the comments indicate that they heard the aircraft's engine noise, continuous and steady, and the noise produced by the impact. Some witnesses say they noticed a change in the noise, immediately prior to the accident, like if the aircraft was returning to the aerodrome, but another witness, who was inside a car with the engine stopped in a creek at the end of the runway, indicated that did not notice a change in the aircraft's engine noise. This witness also heard the noise produced by the impact.
— One of the people, who witnessed the take off, says that saw how the aircraft was going up and down and it seemed to be out of control.
— One of the people interviewed indicated that the baggage compartment was absolutely full, estimating its load weight in approximately 40 kg.
— When the pilot phoned to announce their arrival, he asked if it was possible to refuel in the aerodrome. Since this was not possible, he indicated he would carry enough extra fuel to fly the next leg. Both the ground staff and the crew of the ship that recovered the remains agreed in that he was carrying such fuel quantity since from the ground they could smell the fuel and there were traces of fuel in the sea surface.
— After the take off in the runway with heading 08, the aircraft turned towards the sea where the fog was heavier. According to an expert's opinion who resides in the area, it is strange to see an experienced pilot making this manoeuvre in the existing fog conditions, especially knowing the area like the pilot did, since he flew over it the day before. The same expert said that if he had been present during the pre-flight preparation, he would have tried to dissuade the pilot from conducting the flight.

1.17. Organizational and management information

Not applicable.

1.18. Additional information

1.18.1. *Aircraft behaviour during stall entry*

From the results of stall entry in-flight tests carried out for the aircraft certification, the following information has been extracted:

— With wings levelled and reduced power, a buffet appears that increases when pulling the stick. The aircraft does not sink even when the stick is at its rearmost position and keeps a slight nose up attitude. The buffet seems to be caused by the empennage vibrations in the wake turbulence generated by the fuselage rather than by a full or partial wing stall entry.
— In the same wing position but with full throttle, the situation is completely different. The buffet does not appear at all or it does just when the aircraft stalls. Nevertheless, the stall warning system appears well in advance. Before the stall occurs, the attitude reaches about 30° and it is difficult to reach the rearmost stick position even when the stall has occurred. At stall onset there are quick pitch oscillations, increasing in amplitude if flaps are retracted, or a slow altitude loss and weak roll instability if flaps are extended.
— During turns, the behaviour differs very little from what has been explained in the preceding paragraphs.

1.19. Useful or effective investigation techniques

They had not been used.

2. ANALYSIS

2.1. Flight progress

According to the flight plan, filed by phone by the pilot and generated in the operations office of Santiago airport, the aircraft manufactured by Robin, model ATL «Club», with registration mark F-GFNB, owned by the pilot and with him and a passenger aboard, planned to take off at 11:30 h from the Villaframil–Ribadeo airport, in Lugo province with destination Santiago airport. The estimated duration of the flight was 1 h 10 min, the cruise speed was 75 kt, the cruise altitude was VFR flight level and the endurance was 3 h.

According to the witnesses, there was heavy fog at low altitude, especially over the sea, limiting the visibility to less than 300 m. At altitude, there were no clouds, and the sun was visible in some areas. The weather forecast confirmed those observations and also indicated the existence of fog in the area. According to the pilot statements, he had received information of good visibility at altitude and at the destination airport.

The aircraft took off, shortly after 12:30 h, on runway 08 heading towards Ribadeo (Lugo) and during the initial climb started a turn towards the sea, where the fog was heavier and it went out of sight.

After this turn and possibly without levelling the wings, the pilot initiated another turn, probably to return to the aerodrome or caused by disorientation due to the fog, since there was a change in the engine noise, observed by all witness that could hear it, and then, the accident occurred.

No radio communication was received prior to the impact and nobody witnessed the accident happen. The impact against the sea was heard by several people who were cleaning the beach and doing other tasks, in a creek located 500 m from the end of the runway.

The rescue services were activated immediately and they only located some parts of the wreckage; among the remains there was the two aircraft occupant bodies, close one to the other and outside the cockpit, and the remains of a wing broken at 60 cm from the tip, the two stabilizers, one wheel, fragments of the seats and some objects. Those remains were found at the coordinates 043° 33.500’ N/007° 03.900’ W.

No other remains were found afterwards in spite of the use of divers, possibly because of the marine currents, the depth of the sea in the zone in which the accident occurred and the existence of abundant vegetation in the marine bed.

2.2. Accident considerations

Since some people in the vicinity heard the noise of the impact of the aircraft against the sea, the accident occurred near the coastline, few minutes after the takeoff.

Since most of the witness statements about the accident indicate that the engine noise was steady until the end and there was neither a radio call nor attempt, it is considered very improbable the existence of any technical malfunction in the aircraft in the short duration of the flight until the accident occurred.

The turn during the initial climb proves the pilot had control, therefore excluding the possibility of the controllability problems that were mentioned by one of the witnesses. The fact that the turn was made towards the sea, just where the fog was heavier, added to the fact that the pilot turned towards this area even though he was familiar with it after flying over it the day before, reinforces the idea that the aircraft was functioning properly and that the pilot lacked experience. According to the information gathered, the pilot only had about 30 h of solo flight time.

The hypothesis that states the aircraft was trying to return to the aerodrome is reinforced by the change in the engine noise, indicated by almost all the witnesses, and by the proximity of the wreckage with the coastline at the accident site.

From the analysis of the recovered wreckage, especially the breakage of the left wing at 60 cm from the tip, it can be concluded that the left side of the aircraft impacted first, coincident with the actual sense of the turn being carried out, and that the impact happened at a relatively high speed.

Additionally, there are other factors that may have contributed to the sequence of the accident, such as the lack of an attitude indicator on board and the limited engine power. The presence of an attitude indicator on board constitutes an aid to the pilot in case of suffering spatial disorientation, since it provides information about the aircraft attitude. The limited engine power produces, among other considerations, the climb gradient to be reduced by the increase in aircraft weight.

The different factors discussed above lead to the following probable explanation of the sequence of the accident:

During climb after take off, the pilot turned left towards the sea, entering the heaviest fog area.

With the intention of obtaining the maximum altitude gain in order to exit the fog as fast as possible, the aircraft was possibly flying at a high angle of attack, close to stall. Nevertheless, the climb gradient was reduced, given the aircraft actual weight and the available power, and the altitude gain was probably very slow.

In those circumstances, since they could not exit the fog probably because the layer was thicker than expected, the pilot, without horizontal reference and with possible spatial disorientation, decided to return to the aerodrome and further tightened the left turn. During this manoeuvre, the aircraft could have entered a stall. It is possible the centre

of gravity was in an aft position if the flight was being conducted with certain excess of baggage, as noticed by some statement. In those conditions, less effort and stick deflection was required, favouring the possible stall entry. The mentioned stall entry could also have started in the lower wing, the left one, with lower airspeed during the turn. The fact that the aircraft wings are slightly sweptback means that the wingtip zone stalls first, resulting in a loss of roll control.

Stall entry could have been hidden to the pilot since, as it was mentioned before, with high power settings it occurs without buffeting and only with pitch oscillations. It is also possible that either the stall warning came with a little delay or it was ignored by the pilot due to heavy workload or disorientation.

3. CONCLUSION

3.1. Findings

— The pilot held a current Aeroplane Private Pilot License with the ratings required for the type of flight he was conducting. Nonetheless, his experience was limited in view of his flight time, especially in solo flight.
— The aircraft had its corresponding Airworthiness Certificate, current at the date of the accident and the last maintenance inspections had been conducted within the specified time limit in an approved facility.
— The flight was being conducted under VFR. Prior to the flight, the corresponding Flight Plan was filed via telephone at the destination airport office, in Santiago.
— The weather conditions existing in the area indicated heavy fog that reduced visibility, especially over the sea, with visibility less than 300 m. During the initial climb, the aircraft turned towards that direction for undetermined reasons.
— During the turn the aircraft crashed against the sea surface, resulting and was completely destroyed.
— Both occupants were fatally injured. It was only possible to recover part of the wreckage that was floating on the sea, including both occupant corpses. The rest of the wreckage sank and it could not be located nor recovered in spite of the search efforts.

3.2. Causes

It is considered that the accident was originated in a left turn during the initial climb, with limited visibility due to fog. The manoeuvre was performed probably with the intention of returning to the departure aerodrome since there was limited visibility, and the aircraft could have stalled due to the impossibility of the pilot to maintain a safe speed, given the actual weight and available power conditions, or due to a pilot's possible spatial disorientation caused by the lack of visual references, directing the aircraft in a collision path against the sea surface.

4. SAFETY RECOMMENDATIONS

None.

APPENDICES

APPENDIX A
Accident location

Figure A-1. *Map of the accident zone*

APPENDIX B
Wreckage

Photo B-1. *Stabilizers wreckage*

Photo B-2. *Left wing wreckage*