CIAIAC

COMISIÓN DE INVESTIGACIÓN DE ACCIDENTES E INCIDENTES DE AVIACIÓN CIVIL

Report A–014/2015

Accident involving a Hughes 369D aircraft, registration EC-LXF, operated by HELITRANS PYRINEES, in the ocean 3 NM east of Pinedo (Valencia, Spain) on 19 May 2015

GOBIERNO DE ESPAÑA

MINISTERIO DE FOMENTO

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Notice

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 object of the investigation, and its probable causes and consequences.

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) nº 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1., 4. and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

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

This report was originally issued in Spanish. This English translation is provided for information purposes only.

Contents

Abbreviations

00:00	Hours and minutes (length of time)
00°	Geometric degrees / Magnetic heading
00°C	Degrees centigrade
AEMET	Spain’s National Weather Agency
AESA	Spain’s National Aviation Safety Agency
APP	Approach control station
ATC	Air traffic control
CAMO	Continuous Airworthiness Management Organization
CIAIAC	Spain’s Civil Aviation Accident and Incident Investigation Commission
DGAC	Spanish Civil Aviation General Directorate
ELT	Emergency Locator transmitter
FAA	Federal Aviation Administration
ft	Feet
g	Acceleration due to gravity
GEAS	Civil Guard’s specialist diving unit
HEMS	Helicopters used for commercial air transport emergency medical service operations
HHO	Helicopters used for commercial air transport hoist operations
HUET	Helicopter Underwater Escape Training
IFR	Instrument flight rules
kg	Kilograms
kt	Knots
l	Liters
Lb	Pounds
m	Meters
MHz	Megahertz
ms	Milliseconds
N	North
N1	Compressor RPMs
NM	Nautical Miles
NR	Rotor RPMs
NVIS	Helicopters used for commercial air transport operations with the aid of night vision imaging systems
QNH	Altimeter sub-scale setting to obtain elevation when on the ground
RCC	Rescue Coordination Center

RD	Royal Decree
RPM	Revolutions per minute
s	seconds
SASEMAR	Maritime Rescue and Safety Society
SP	Single-pilot
SPO	Special Operations
SSM	Maritime Rescue and Safety Society
TMA	Terminal control area
TSO	Technical Standard Order
VFR	Visual flight rules
VLC	Valencia
W	West

Synopsis

Operator:	HELITRANS PYRINEES
Aircraft:	Hughes 369D; registration EC-LXF
Date and time of accident:	Tuesday, 19 May 2015 at 15:18[1]
Site of accident:	In the ocean 3 NM east of Pinedo (Valencia, Spain)
Persons onboard:	2. 1 crew, minor injured and 1 passenger, seriously injured.
Type of flight:	Aerial work - Non-commercial-Other-Positioning flight
Phase of flight:	En route
Date of approval:	27 June 2016

Summary of the event:

On Tuesday, 19 May 2015 at 14:00, helicopter EC-LXF took off from the temporary heliport in Huércal-Overa (Almería) on a positioning flight to La Seu d'Urgell (Lleida). Onboard the aircraft were the pilot and another occupant who was also a helicopter pilot but who had no flight duties in the cockpit.

Upon reaching the Valencia TMA, the pilot requested to proceed from Cullera to Sagunto along the coastline at 1000 ft or below, which Valencia Approach Control authorized.

While flying over the sea, they heard a loud noise in the helicopter, which started rotating violently left while banking right.

The pilot ditched the aircraft and issued a MAYDAY on the radio at 15:18. The helicopter fell into the sea and sank. The occupants managed to exit the aircraft under their own power.

An aircraft flying in the area received the MAYDAY call and notified Valencia approach control. Upon verifying that they had lost the radar signal from the aircraft, they activated the search and rescue services.

[1] All times in this report are local unless otherwise specified.

The two occupants were rescued alive by a SASEMAR vessel.

The helicopter wreckage could not be found despite a months-long search under water.

Based on the statements of the helicopter's occupants, the most probable cause of the accident seems to have been the interruption of power transmitted from the engine to the main transmission through the shaft joining them.

This report contains four safety recommendations for Spain's National Aviation Safety Agency (AESA) and Spain's General Directorate for Civil Aviation (DGAC) involving the need to carry life jackets onboard and to have water survival training.

1. FACTUAL INFORMATION

1.1. History of the flight

On Tuesday, 19 May 2015 at 14:00, helicopter EC-LXF took off from the temporary heliport in Huércal-Overa (Almería) on a positioning flight to La Seu d'Urgell (Lleida). Onboard the aircraft were the pilot and another occupant who was also a helicopter pilot but who had no flight duties in the cockpit.

The flight took place at an altitude of 4500 ft. Upon reaching the Valencia TMA, instead of flying over it at a minimum altitude of 6500 ft, due to storm cells the pilot decided to proceed from Cullera to Sagunto along the coastline at 1000 ft or below, which Valencia Approach Control authorized.

While flying over the sea, off the coast from El Saler (Valencia), they heard a loud noise inside the helicopter, which started rotating violently to the left while banking to the right.

The pilot made an emergency landing on the water and issued a MAYDAY on the radio at 15:18. The helicopter fell to the ocean and sank. The occupants managed to exit the aircraft under their own power and started to swim towards shore.

An aircraft flying in the area received the MAYDAY call and notified Valencia approach control. Upon verifying that they had lost the radar signal from the aircraft, they activated the search and rescue services.

At 15:26, a SASEMAR aircraft that was flying in a nearby area was instructed to aid in searching for the helicopter.

At 15:40 the Palma RCC dispatched an airplane and a helicopter to take part in the search operation.

At 15:47 the SASEMAR aircraft spotted an oil slick in the water.

At 15:48 a SASEMAR vessel was dispatched.

At 16:27 the SASEMAR vessel located and rescued the helicopter's occupants.

The helicopter wreckage could not be found despite a months-long search under water.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious		1	1	
Minor	1		1	N/A
None				N/A
TOTAL	1	1	2	

1.3. Damage to aircraft

The aircraft is missing under the water.

1.4. Other damage

Not applicable.

1.5. Personnel information

Pilot of the aircraft

Age:	42
Nationality:	Spanish
Medical certificate:	Valid until 07/11/2015
Commercial helicopter pilot license (CPL (H)):	Initially issued by AESA on 18/08/1995
Ratings:	
• HU369/MD500N/600N/SP	Valid until 31/03/2016
• AS350/EC130/SP	Valid until 31/03/2016
• AS355/SP	Valid until 30/04/2016
Total flight hours:	8503
Total hours on the type:	85
Hours in the last 30 days:	25
Hours in the type in the last 30 days:	7

The pilot had not taken the helicopter underwater escape training course, which was not required for the accident flight.

1.6. Aircraft information

1.6.1. General

The Hughes 369D helicopter is outfitted with a Rolls Royce 250-C20B turboshaft engine, has a maximum takeoff mass of 3000 lb (1361 kg) and a 5-seat configuration.

On this helicopter model, the main rotor is articulated and has five blades that rotate counterclockwise as seen from above. The countertorque is provided by the two-bladed, semi-rigid tail rotor.

The engine power is sent to the main transmission through a shaft. This power is in turn transmitted to the tail, or countertorque, rotor via another shaft. There is a freewheel located on the shaft through which the engine supplies power. This freewheel rotates in one direction and prevents the main transmission from dragging on the main engine in the event of an engine stoppage, thus allowing the helicopter to autorotate.

The main transmission drives the hydraulic, electrical and other systems.

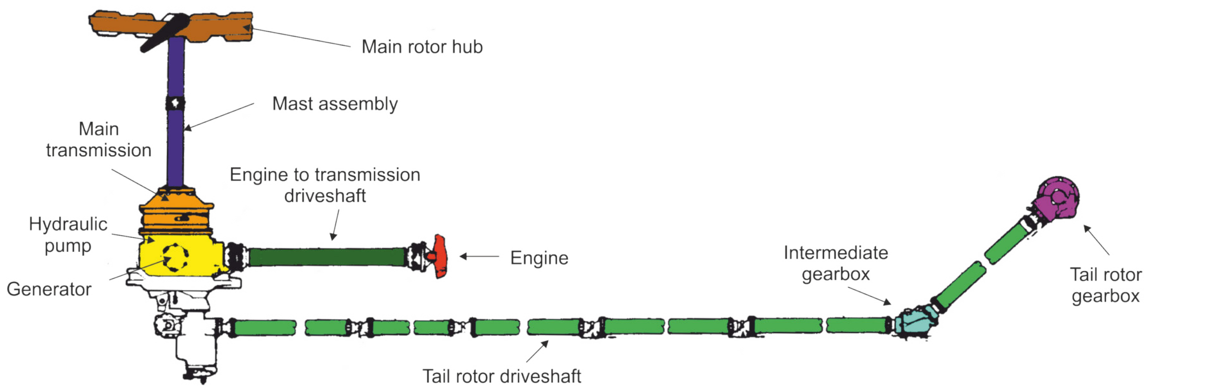


Figure 1. Diagram of the helicopter's transmission system

1.6.2. History of the aircraft

The helicopter, registration EC-LXF, was built in 1976 with serial number 1170220D. It was outfitted with a Rolls Royce 250-C20B turboshaft engine made in 1980 with serial number 831810.

It had a Certificate of Airworthiness issued on 17 May 2013 by AESA. On 22 May 2013, AESA issued the Airworthiness Review Certificate and on 12 September 2014, the Helitrans Pyrinees CAMO extended the airworthiness review, expiring on 12 May 2015.

The registration certificate was issued by AESA on 25 September 2013 and was valid until 25 February 2019.

According to the technical information provided, at the time of the accident the helicopter had 14393 flight hours, and the engine 3136.

1.6.3. Maintenance

The last check of the aircraft was done on 14 May 2015, with 14387 hours on it, and consisted of an inspection of the main rotor that is carried out every 25 hours, as per the aircraft's Approved Maintenance Program.

In September 2014, with 14299 hours on the aircraft, a check of the airframe was carried out. It included the 25, 100, 300, 600 and 2770 hour checks, and the 12, 24 and 48 month checks, as per the Maintenance Program. The scheduled inspection of the engine was also conducted, which included the 100, 200, 300, 500 hour and 12 month checks.

This maintenance was conducted by the Helitrans Pyrinees maintenance center, with AESA approval ES.145.199.

According to the aircraft's Approved Maintenance Program, maintenance personnel are not required to perform any tasks due to the aircraft's having been idle for a month or month and a half, as noted by the pilot.

1.7. Meteorological information

According to Spain's National Weather Agency (AEMET), on the day of the accident there was a cold front over the region of Valencia. This front produced intense storm cells inland in the province of Valencia, and in the provinces of Albacete and Cuenca, as shown in the weather radar images below.

Waves on the Valencia coast were 1 meter high at the time of the accident, and the water temperature was around 19° C.

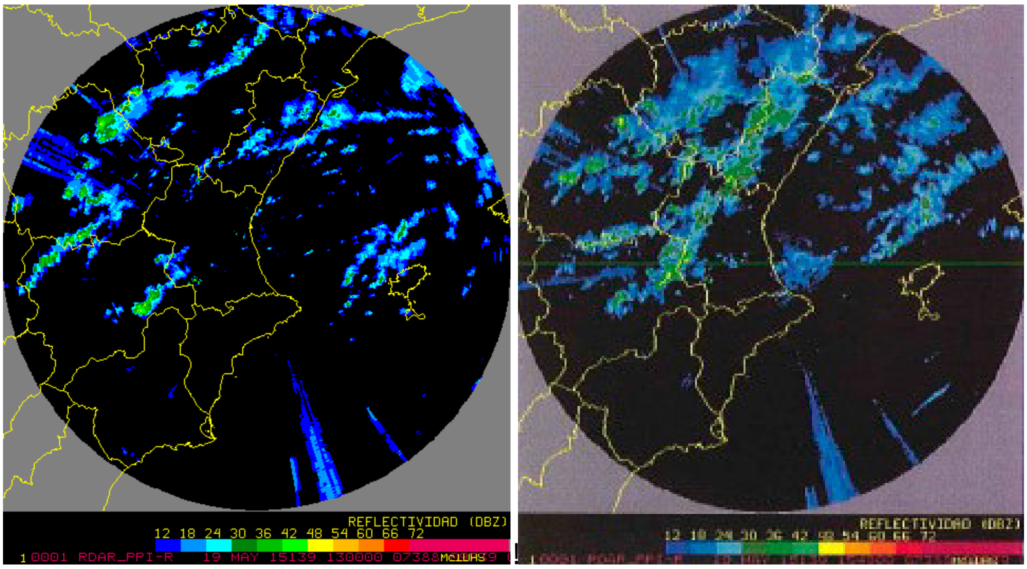


Figure 2. Weather radar images at 15:00 and 17:50

1.8. Aids to navigation

Not applicable. The flight was being conducted under visual flight rules.

1.9. Communications

At 15:00 the pilot of EC-LXF contacted Valencia Approach (VLC APP) on the 120.1 MHz frequency. The pilot requested to proceed from Cullera to Castellón at 1000 ft or lower. VLC APP cleared the pilot to proceed to Cullera along the coastline to Sagunto at 1000 ft or lower, adding that the QNH was 1011. The pilot read back the clearance and the QNH.

At 15:18 a station issued an intermittent MAYDAY, which was received by an aircraft flying in the area. This aircraft alerted Valencia Control, which deduced that the MAYDAY must have been from EC-LXF, as it had been the last VFR traffic on that frequency, it had disappeared from radar and it was not answering its calls.

At 15:21 ATC informed the crew of a commercial aircraft that had joined the frequency of the event and asked if they could see the helicopter in the sea. Minutes later the commercial aircraft reported not seeing the helicopter and continued with its flight.

At 15:32 SSM101M contacted on the frequency 120.1 MHz, and ATC gave it information on the last approximate position of the helicopter.

At 15:45 SSM101M reported reaching the area and searching in a circling pattern.

At 15:47 SSM101M reported seeing a fuel slick in the water.

At 15:52 ATC confirmed for SSM101M the exact coordinates where contact had been lost with the helicopter. SSM101M reported that they had notified a surface vessel to approach the area and confirm that the coordinates provided by ATC matched those of the fuel slick it had spotted.

At 16:27 SSM101M reported there were two live individuals in the water and asked ATC the number of passengers onboard the helicopter. ATC replied there were two people onboard.

At 16:28 SSM101M reported that the vessel had picked up two survivors.

1.10. Aerodrome information

Not applicable. The accident occurred while the aircraft was flying over the sea.

1.11. Flight recorders

The aircraft did not have any flight recorders since they were not required for aircraft of its type.

1.12. Wreckage and impact information

The Valencia Civil Guard's specialist diving unit (abbreviated GEAS in Spanish) conducted diving operations in the area of the accident almost daily in the months after the accident in an effort to locate the aircraft's wreckage.

No debris belonging to the aircraft was found.

1.13. Medical and pathological information

The pilot was slightly injured and the other occupant more severely injured with various fractures and multiple trauma.

1.14. Fire

There was no fire.

1.15. Survival aspects

1.15.1. Survival in the water

The aircraft's occupants exited the helicopter under their own power. One hour and nine minutes elapsed from the time the MAYDAY signal was heard until they were picked up by the SASEMAR vessel.

On its website, Marine Rescue states that one of the main obstacles to surviving in water is hypothermia, which is when the body temperature falls below 37.5°. The same website contains a graph relating water temperature to survival time in hours (see Figure 3).

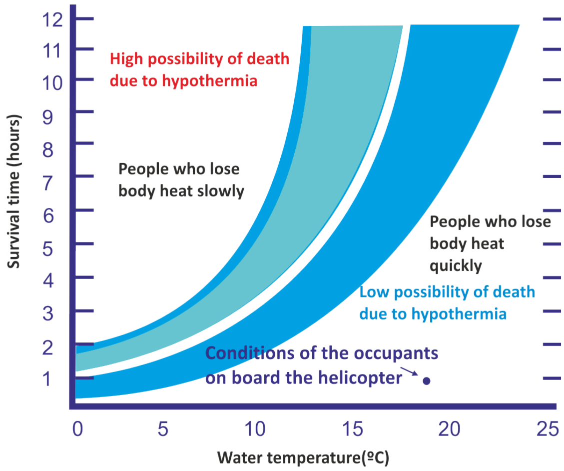


Figure 3. Hypothermia graph

1.15.2. Requirements for flying over water

The helicopter made a flight over water even though there were no life jackets onboard and the pilot had not taken the water survival course.

In reference to helicopter operations, *REGULATION (EU) no. 965/2012 OF THE COMMISSION of 5 October 2012, laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council, and Royal Decree 750/2014 of 5 September, which regulates aerial firefighting and search and rescue activities, and lays down the requirements involving airworthiness and licenses for other aviation activities*, contain sections pertaining to training and courses on water survival and the requirement to take aboard life jackets.

Regulation 965/2012 lays down requirements on the use of life jackets for operations over the ocean for all aircraft to which it applies. The accident flight was governed by the SPO (Special Operations) part, though on the date of the accident this part was not yet in effect (it went into effect in Spain on 21 April 2016). This part specifies that other-than-complex motor-powered helicopters must be equipped with a life jacket for each person onboard when:

1) On a flight over water beyond autorrotational distance from land when, in the event of a critical engine failure, it is unable to maintain level flight, or

2) On a flight over water at a distance from land corresponding to more than 10 minutes flying time at normal cruising speed when, in the event of a critical engine failure, it is able to maintain level flight, or

3) When taking off or landing at an aerodrome or operating site where the takeoff or approach path is over water.

Regulation 965/2012 only requires water survival training for crews engaged in HEMS[2], HHO[3] or NVIS[4] operations.

As for Royal Decree 750/2014, it lays out the requirement to have life jackets in both complex[5] and other-than-complex motor-powered helicopters. As concerns water survival training, it is required for all helicopters, adapted to the type and area of operation.

Book V of Spain's *Air Traffic Regulations* contains the specific regulations for helicopter operations. Nowhere does this book mention the need for life jackets, life rafts or survival training/courses. In contrast, Section 7.2.5.3 of these same regulations, on general aviation, specifies that when flying en route over water a distance in excess of their gliding distance, all single-engine airplanes must carry one life jacket or individual flotation device for every person onboard. For all other airplanes, it specifies that life jackets must be carried when the airplane could be over water and more than 50 nautical miles away from a suitable location in which to make an emergency landing.

The Air Traffic Regulations do not lay out requirements for water survival courses/training for either helicopters or airplanes.

However, Part B, Section 10 of the Aerial Work Operations Manual of Helitrans Pyrinees specifies that "The captain shall ensure that when carrying out Performance Class 3 operations over water, the duration of the flight and the conditions to be encountered shall be considered when deciding whether all the occupants must have a life jacket".

1.15.2.1. HUET (Helicopter underwater escape training)

This course is designed for crewmembers and passengers of aircraft that fly over water and that may be subject to ditching.

[2] HEMS: helicopters used in commercial air transport for medical emergencies.

[3] HHO: helicopters used in commercial air transport for hoist rescue operations.

[4] NVIS: helicopters used for commercial air transport operations aided by night-vision imaging systems.

[5] Complex powered helicopter: helicopter certified for a maximum takeoff weight in excess of 3175 kg, for a maximum configuration for seating more than nine passengers, or for operating with a minimum crew of two pilots.

It is intended to provide the knowledge, understanding and skills needed to act in the event of a crash landing over water so they can survive at sea and effectively cooperate in their own rescue.

The course lasts one day and features theory and practical training.

The theory portion deals with topics such as helicopter emergencies, ditching, crash landing, leaving the helicopter, exit points and individual protective equipment.

The practical portion is conducted in a pool and deals with aspects involving exiting the helicopter after ditching, using flotation devices and emergency equipment.

1.15.3. Characteristics of the emergency radiobeacon (ELT)

The helicopter was equipped with a position indicating system, namely, a Pointer 3000-10 emergency radiobeacon. It was manufactured in 2008 with serial number 346843. Its battery was replaced by the operator on the 4th of May in 2015.

This beacon transmits on the 121.5 MHz and 243.0 MHz frequencies, and can be activated manually or automatically. The automatic activation is triggered by a deceleration inertia "G" switch, which is activated when the unit detects longitudinal inertial forces as per TSO-C91A [6].

Technical Standard Order TSO-C91A specifies the level of automatic activation at forces equal to or greater than 5 g's and lasting 11 ms or more in the direction of the aircraft's longitudinal axis.

The manufacturer of the ELT specifies that is must be installed on a primary structure and, in the case of helicopters, it must be rotated 45° from its longitudinal axis.

According to information from the ELT manufacturer, the signal issued by the beacon can be heard up to 30 NM away by a search airplane that is at 10,000 ft (this distance varies with weather and topographical conditions). But if the aircraft is completely submerged under the water, the signal is attenuated.

No signal was received from the ELT on aircraft EC-LXF.

[6] A TSO (Technical Standard Order) lays out specifications or minimum standards issued by the Authority for specific materials, parts, processes and components used in civil aircraft. TSO-C91A was issued by the FAA.

1.16. Tests and research

1.16.1. Pilot's statement

The pilot reported that the helicopter had been idle in La Seu d'Urgell between a month and a month and a half. Before taking off for Huércal-Overa on the day of the accident, he himself did a pre-flight check and saw nothing wrong. Maintenance personnel did not inspect the aircraft.

On the same day he left from La Seu d'Urgell, he and the other occupant arrived in Huércal-Overa. While there, they were operating with external loads weighing approximately 240, 180 and 160 kg over two periods lasting 15 and 12 minutes. During the flight the helicopter did not exhibit any problems.

After finishing their work, they took off to return to La Seu d'Urgell. Since they had an auxiliary tank, they planned to go directly to the destination, estimating a flight time of just over two hours and a three-hour endurance with the auxiliary tank. In any case, they wanted to fly over the area of Castellón Airport in case they needed to refuel.

They took off from Huércal-Overa at around 14:00. The return flight to La Seu d'Urgell was made with the transponder on and in contact with Murcia, Alicante and Valencia control. They flew at an altitude of 4500 ft.

Upon reaching the Valencia TMA, instead of climbing to 6500 ft, they requested to fly in the Cullera corridor at 1000 ft due to storm cells.

Once in the Cullera corridor at 1000 ft or lower, they flew a route over the sea that would take them near the port of Valencia. When off the coast of El Saler he heard a very loud noise from an indistinct direction. Immediately following the noise, the helicopter started rotating left while banking right. The force of the rotation was such that the centrifugal force caused the helicopter doors to detach.

The pilot lowered the collective and shut the throttle to autorotate. At the same time, he issued a MAYDAY on the radio. During the descent he thinks he was applying full right pedal.

The pilot thinks that the fault could have been caused by the main transmission starting to seize. He based this argument on the leftward rotation of the main rotor blades, thinking that if they had lost the tail rotor, the helicopter would have rotated to the right, and not to the left as actually happened.

The pilot estimated it took them 20 seconds to reach the water. Before contacting the water, the pilot decelerated to mitigate the impact. When the helicopter contacted the water, it was still rotating left and banking to the right. The helicopter sank very quickly, and as it did, both occupants exited the helicopter via the right door after removing their seat belts.

Once in the water they decided to swim towards shore. Twenty minutes after impacting the water an airplane flew overhead. They signaled the airplane but did not think they had been seen. A vessel rescued them 55 minutes later.

The pilot stated that the helicopter was equipped with an ELT and that there were no life jackets onboard. The helicopter was not outfitted to fly in IFR conditions.

1.16.2. Statement from the passenger

The other occupant stated that he had flight experience in the model involved in the accident.

He accompanied the pilot to Almería and on the way back they would head directly to the La Seu d'Urgell airport.

The purpose of the trip was to do external loads operations. When asked if the helicopter had been overloaded during these operations, he said no because the loads were not very heavy.

The pilot told him of the bad weather and the possibility of diverting. During the flight they were going to fly over Valencia, but the pilot requested to descend to 1000 ft and divert over the shore. There were no life jackets onboard.

While flying at 120 kt, the helicopter turned sharply left 45° while rolling to the right at 10°. The left turn stopped suddenly. Five seconds later, there was a loud noise and the helicopter again started to rotate in a full circle sharply to the left. The right bank angle persisted, though it later diminished. During the rotation both his and the pilot's doors detached. The helicopter banked to the right. During the descent, the pilot reduced the RPMs just before the helicopter hit the water. The helicopter's descent rate was slowed and it gently contacted the water, turning on its left side. He thinks the helicopter made about 15 rotations. The engine continued running throughout.

As the helicopter was making its first rotation there were no lights on, but by the third or fourth rotation he saw that the low rotor RPMs light was on and the low RPMs alert was sounding. He thinks it is because the pilot reduced the RPMs.

Once in the water he unlatched his seat belt. He exited first and then the pilot, both via the right door, and they started swimming towards shore and then towards a merchant ship. While they were swimming they saw a SASEMAR aircraft. They were picked up by a boat.

They did not have life jackets onboard. They did not activate the emergency radiobeacon. They made one MAYDAY call on the radio.

He stated that a few days before the accident he had taken the HUET water survival course, which had helped him tremendously.

1.17. Organizational and management information

Not applicable.

1.18. Additional information

1.18.1. Engine failure with complete loss of power

If the engine stops, the red ENGINE OUT light (low rotor RPM indicator) turns on in the warning panel and an audible alert is sounded. The helicopter will yaw left, the engine and rotor RPMs will both fall and the noise level will change.

The amount of yaw is dependent upon the amount of torque at the moment of power loss. High torque will cause a large yaw while low torque will cause a relatively small yaw.

When the ENGINE OUT warning is received, the pilot has to respond immediately by adjusting the collective to maintain the main rotor RPMs within the specified limits. The pilot must then check the engine instruments and other indications to confirm engine trouble.

The failure indicators are activated when N1 falls below 55% or NR falls below 468.

The procedure for an engine failure when cruising at 500 ft above ground level or higher requires carrying out the following initial steps:

- Adjust collective pitch according to altitude and airspeed to maintain rotor speed between 410 and 523 RPM.
- Apply pedal pressure as necessary to control aircraft yaw.

- Adjust cyclic control as necessary to control airspeed and flight path. Allow airspeed to stabilize at 131 Knots IAS or lower.

An autorotation would then be performed. In this situation, the rotor blades move only as a result of the air moving up through the rotor; they are not driven by the engine. In order for the autorotation to be successful, the rotor blades need to be rotating at the start of the maneuver.

A complete loss of energy can occur if the engine stops or if its power is not transmitted to the main transmission by the shaft connecting it to the engine. If the driveshaft between the engine and the main transmission were to break, the characteristics of this would be as described above, except there would be no signs that the engine had stopped.

Figure 4[7] shows an example of descent angles for several speeds, ignoring the effect of the wind; in other words, the horizontal distance that the helicopter could travel for a given initial altitude using the autorotation technique.

According to the helicopter's radar return, it was flying 700 ft over the ocean surface, which in the figure translates to a horizontal distance of between 1300 and 2000 feet, depending on the speed. This is equivalent to between 0.2 and 0.33 NM. The wind and the individual characteristics of each helicopter model can alter this calculation, meaning these data are only approximate.

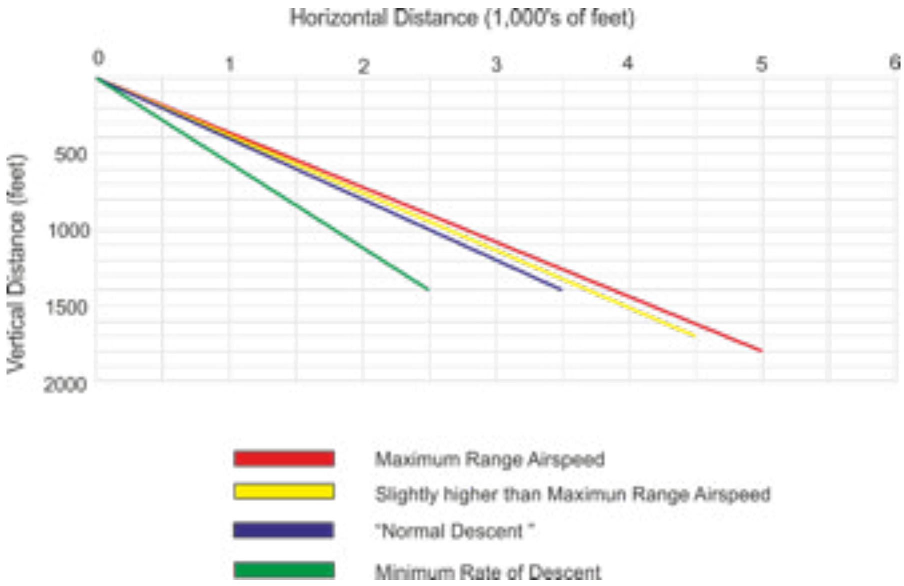


Figure 4. Descent angles

7 Shawn Coyle. Cyclic & Collective. Helobooks.

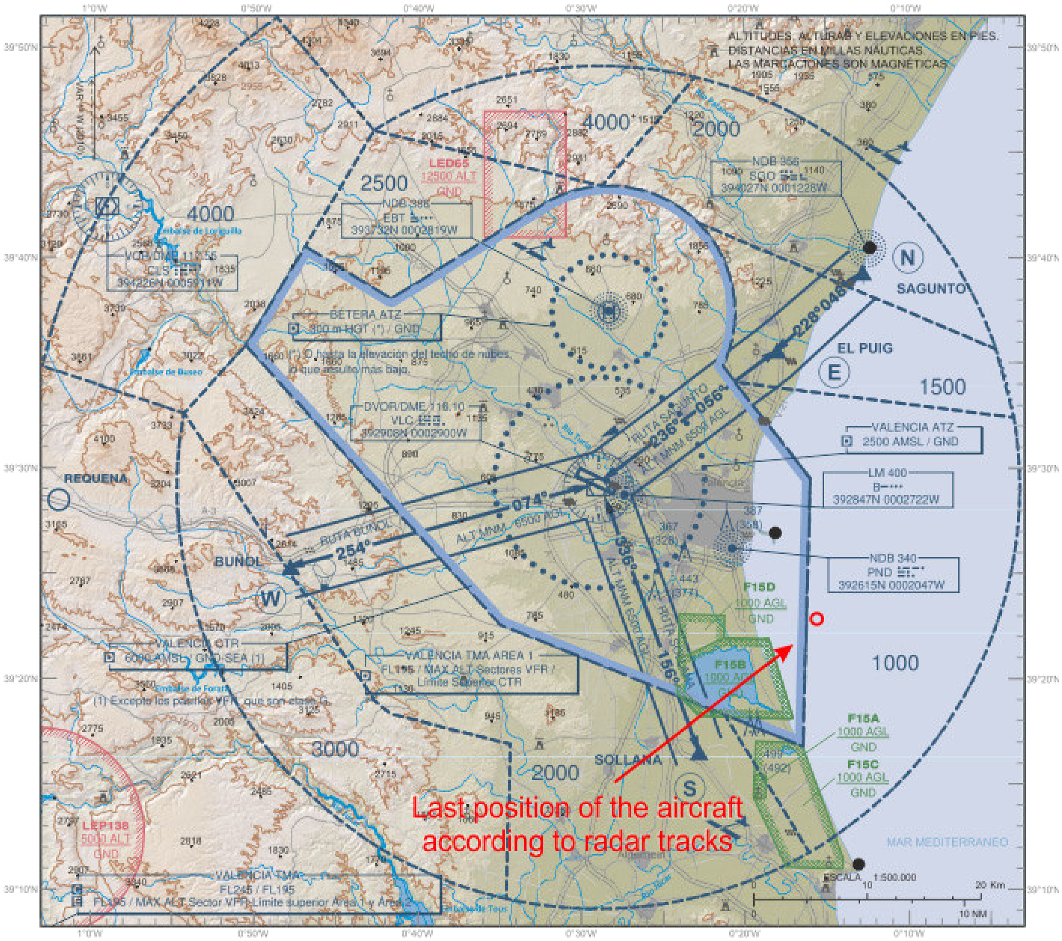
1.18.2. Visual approach chart for Valencia

The visual approach chart for routes flying over Valencia shows that in order for a VFR flight to cross this area using one of the defined D airspace corridors, it has to maintain a minimum altitude of 6500 ft.

The other option for crossing the area would be to use the non-controlled G airspace visual sectors.

The chart in Figure 5 shows the approximate location of the helicopter based on its last known radar position. The visual sector in which the helicopter was flying at the time had a maximum altitude of 1000 ft. The radar return showed that the helicopter was flying at an altitude of 700 ft at the time of the failure.

CARTA DE APROXIMACIÓN VISUAL / VAC - OACI RUTAS DE SOBREVUELO	ELEV AD 240	APP 120.100 TWR 118.550 GMC 121.875 ATIS 121.075	VALENCIA/Manises LEVC



SOBREVUELOS

Los tránsitos VFR que pretendan atravesar el Área 1 a altitudes superiores a las definidas por los sectores visuales no controlodos definidos como espacio aéreo clase G, deberán establecer contacto radio con Valencia APP, con anterioridad a la entrada en este área, y solicitar autorización de entrada y sobrevuelo en espacio aéreo clase D. Valencia APP, en función de la situación del tráfico, otorgará el permiso ajustándose a las rutas VFR Sagunto, Buñol y Sollana, y a la altitud que determine, que no será inferior a 6500 ft.

Estos corredores están definidos por las rutas de sobrevuelo:
- RUTA SAGUNTO: Sagunto/ El Puig/ Valencia AD, en ambos sentidos. Altitud mínima a mantener 6500 ft.
- RUTA SOLLANA: Sollana/ Valencia AD, en ambos sentidos. Altitud mínima a mantener 6500 ft.
- RUTA BUÑOL: Buñol/ Valencia AD, en ambos sentidos. Altitud mínima a mantener 6500 ft.

Esta restricción no se aplicará a las aeronaves con destino/salida Bétera HEL.

OBSERVACIONES

Está prohibida la circulación VFR por el CTR o rutas VFR para las aeronaves que no vayan provistas de enlace radio en ambos sentidos y equipo SSR.

OVER LIG TS

VFR aircraft that intend to cross Area 1 at altitudes above those established by the uncontrolled visual sectors defined as Class G airspace, shall establish radio contact with Valencia APP before entering this area and request clearance to enter and overfly within Class D airspace. According to the existing traffic, Valencia APP will grant the proper permission keeping to VFR lanes: Sagunto, Buñol and Sollana; at the given altitude wich never be lower than 6500 ft.

These lanes are defined by the overflying routes:
- SAGUNTO ROUTE: Sagunto/ El Puig/ Valencia AD, in both directions. Minimun altitude to maintain 6500 ft.
- SOLLANA ROUTE: Sollana/ Valencia AD, in both directions. Minimum altitude to maintain 6500 ft.
- BUÑOL ROUTE: Buñol/ Valencia AD, in both directions. Minimum altitude to maintain 6500 ft.

This restriction is not applicable to aircraft on departure/arrival from/to Bétera HEL.

REMAR S

VFR traffic within the CTR or VFR routes is forbidden to ACFT not provided with a two way radio equipment and SSR equipment.

CAMBIOS: TITULO DE LA CARTA.

13-DEC-12 (AMDT 231/12) AIP-ESPAÑA AD 2-LEVC VAC 1.1

Figure 5. Visual approach chart for overflight routes at the Valencia Airport

1.18.3. Prior recommendation on the use of life jackets

As a result of the accident that occurred on 2 July 2012 involving a Bell 412 aircraft operated by INAER, registration EC-KSJ, at the Forate Reservoir (Valencia), the CIAIAC issued recommendation 02/14.

Recommendation 02/14: It is recommended that the Civil Aviation General Directorate set in motion the necessary mechanisms within its purview so as to enable a technical modification to the Air Traffic Regulations that extends the use of life vests, currently only required for airplanes flying over water, to helicopters as well.

The DGAC replied that amendments had recently been published to *REGULATION (EU) no. 965/2012 OF THE COMMISSION of 5 October 2012, laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council*, which laid down requirements on the use of life jackets for both commercial and non-commercial helicopter operations,

As for firefighting and search and rescue operations not covered by Regulation (EU) 965/2012, *Royal Decree 750/2014 of 5 September, which regulates aerial firefighting and search and rescue activities, and lays down the requirements involving airworthiness and licenses for other aviation activities* included the applicable stipulations related to life jackets.

The CIAIAC regarded the foregoing as satisfying the purpose of the recommendation, and as a result considered the DGAC's response satisfactory and closed out the recommendation.

Over the course of the investigation into the accident of EC-LXF, the CIAIAC realized that there are helicopter operations not covered by Regulation (EC) 965/2012 or by Royal Decree 750/2014, and that therefore have no requirements concerning the use of life jackets. Such is the case for helicopter operations involving military, customs, police, coast guard or similar activities or services, as well as those carried out using aircraft belonging to one of the categories listed in Annex II of *Regulation (EC) No. 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC*.

1.19. Useful or effective investigation techniques

Not applicable.

2. ANALYSIS

2.1. Change in course due to weather

While approaching the Valencia TMA, the pilot was aware of the limitations imposed by the weather conditions present in Valencia and to the west. The aircraft was not equipped for IFR flights, meaning they had to continue in VFR conditions.

The storm cells meant they could not fly to the west, avoiding the TMA, or fly using the VFR corridors at an altitude of 6500 ft, so the pilot decided to cross using the visual corridor that was over the sea at an altitude of 1000 ft or below.

The radar returns showed that the helicopter was flying over the sea at an altitude of 700 ft and some 3 NM away from the coast.

Based on the graph of descent angles shown in Section 1.18.1, the helicopter could travel a horizontal distance of between 0.2 and 0.33 NM by using autorotation. While this is only an approximate value, it is very far away from the 3 NM distance separating the helicopter from the shoreline, making it impossible for the pilot, at that altitude and distance, to reach land by autorotating, as was indeed the case.

The pilot did not consider the possibility of landing instead of flying over the sea at a distance from shore that was in excess of the autorotation horizontal travel distance.

2.2. Emergency descent

The helicopter was flying at approximately 120 kt when the two occupants, both of them helicopter pilots, heard a loud metallic noise and the helicopter yawed sharply left before descending while rotating quickly to the left.

The pilot initiated an autorotation maneuver, lowering the collective, closing the throttle and applying right pedal, as specified in the emergency procedure for loss of power in the aircraft's flight manual.

The autorotation maneuver was effective. The helicopter landed in the water without excessive force. This, along with the fact that both occupants were wearing their harnesses and seat belts, allowed them to survive the crash landing into the water.

2.3. Survival in the water

The other occupant stated that a few days before the accident he had taken the *Helicopter Underwater Escape Course*, which had helped him keep calm and exit the helicopter more quickly as it was sinking.

Water survival training seems to have been a positive factor in his actions after the crash, and the cost and duration of this training are low in relation to the benefits it provides. Current regulations, however, do not require taking water survival courses/ training for other than commercial air transport helicopter flights over water involved in HEMS, HHO or NVIS operations, or aerial work involving firefighting or search and rescue operations. A safety recommendation is issued in this regard.

The Aerial Work Operations Manual of the company specified that the captain shall consider, when carrying out Performance Class 3 operations over water, the duration of the flight and the conditions to be encountered when deciding whether all the occupants must have a life jacket available.

When the pilot decided to divert from his original route to fly over the sea, he did not consider the indications in the company's Operations Manual. Had he considered the flight conditions, he would have realized that by flying in that sector at 1000 ft, the maximum allowable altitude, the autorotation would not be sufficient to reach land, meaning that they had to have life jackets to fly over that area. Since there were no life jackets onboard, making the flight in those conditions was not an option.

The requirement to have life jackets onboard helicopters other than those covered by Regulation 965/2012 or Royal Decree 750/2014 is not regulated, unlike airplanes, which are regulated under Spain's Air Traffic Regulations. Thus, a safety recommendation is issued to address this gap.

The search and rescue operations were efficient. Only one hour and nine minutes elapsed from the time the MAYDAY signal was issued until the helicopter's occupants were rescued.

The sea state and water temperature were critical to the survival of the helicopter occupants. The absence of marine currents and the low wave height (barely 1 meter) minimized the effort required to stay afloat, thus offsetting the additional effort expended by the absence of life jackets.

The little time that the occupants spent in the water, along with the high water temperature (19° C), prevented any serious complications from hypothermia.

2.4. Mechanical fault

The aircraft's occupants heard a noise and the helicopter started to yaw left.

On this helicopter model, whose rotor turns counter-clockwise, a yaw to the left is indicative of a lack of power of the main rotor, though according to the occupants' statement the engine did not stop. This points to a possible interruption in the transmission of power from the engine to the main transmission.

The main rotor, due to the air flowing from bellow it, continued to windmill, thus driving the main transmission, which did not stop, allowing it to supply power to the tail rotor, electricity through the generator and hydraulics via the associated pump. As a result, a fault of the main transmission can be ruled out.

The engine's power is transmitted to the main transmission through a shaft connecting the two. Based on the information provided by the helicopter's occupants, it is likely that the transmission of power from the engine to the main transmission through the shaft connecting them was interrupted. Since the helicopter wreckage could not be inspected, the cause of this interruption in power could not be determined.

2.5. Activation of the emergency radiobeacon

Neither the pilot nor the other occupant manually activated the ELT.

No station received the signal from the radiobeacon on the emergency frequencies, not even the SSM101M that was flying over the crash site. The manufacturer of the ELT states that the signal issued by the beacon is attenuated under the water. So, if the ELT transmitted any signal it would have been for such a short time that it would not have been enough to be detected by any station.

Since the aircraft wreckage was not found, it was not possible to determine if the antenna was still connected after the impact or if the automatic activation conditions were present. As a result, investigators could not determine if the signal was absent because the automatic activation conditions were not present, because the automatic activation failed or because the antenna cable had detached.

3. CONCLUSIONS

3.1. Findings

- The pilot of the aircraft was properly qualified and had a valid license and medical certificate.
- The aircraft had a valid Certificate of Airworthiness, Airworthiness Review Certificate and registration certificate.
- When the aircraft reached Valencia, there were intense storm cells in the area.
- Due to the storm cells, the pilot diverted from his original route, deciding to fly over the ocean at low altitude instead.
- The autorotation maneuver executed by the pilot was effective and reduced the impact force against the water.
- The helicopter sank in the sea and the wreckage has not been located.
- The company's Operations Manual specified that for operations over water, the captain has to consider the flight duration and the conditions of the flight when deciding whether life jackets have to be available.
- There were no life jackets in the helicopter.
- Despite not having life jackets in the helicopter, the pilot decided to continue flying over water beyond the autorotation distance needed to reach land.
- Spain's Air Traffic Regulations rules the use of life jackets and survival gear in airplanes but not in helicopters.
- The other occupant had taken the ***Helicopter underwater escape training*** course, which helped him exit the helicopter faster as it was sinking.
- Current regulations do not require water survival courses/training for other than commercial air transport helicopter flights over water involved in HEMS, HHO or NVIS operations, or aerial work involving firefighting or search and rescue operations.
- One hour and nine minutes elapsed between the MAYDAY call made by the helicopter pilot and the rescue of the helicopter's occupants.

- The little time that the occupants spent in the water, along with the high water temperature (19° C), prevented any serious complications from hypothermia.

- The absence of marine currents and the low wave height (barely 1 meter) minimized the effort required to stay afloat, thus offsetting the additional effort expended by the absence of life jackets.

- No signal was received from the ELT on aircraft EC-LXF.

3.2. Causes/Contributing factors

The most probable cause of the accident is an interruption in the transmission of power from the engine to the main transmission through the shaft that joins them.

4. SAFETY RECOMMENDATIONS

Recommendations for the National Aviation Safety Agency:

REC 42/16. It is recommended that AESA consider taking the regulatory initiative so as to rule the need to carry life jackets or individual flotation devices during civil helicopter operations to which neither Regulation 965/2012 nor Royal Decree 750/2014 applies.

REC 43/16. It is recommended that AESA consider taking the regulatory initiative so as to rule the need to conduct water survival training for flights over water during aerial work operations different from firefighting and search and rescue operations.

Recommendations for the Civil Aviation General Directorate:

REC 44/16. It is recommended that the DGAC rules the need to carry life jackets or individual flotation devices during civil helicopter operations to which neither Regulation 965/2012 nor Royal Decree 750/2014 applies.

REC 45/16. It is recommended that the DGAC rules the need to conduct water survival training for flights over water during aerial work operations different from firefighting and search and rescue operations.