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Pilot Asphyxiated by Headset Cable After Surviving Failures of Seat and Harness

The failure of the seat reduced the pilot's probability of surviving the accident, the official accident investigation report said. Yet the seat met the specifications that were in effect at the time the helicopter had been certified in the United Kingdom, and which still applied to the accident aircraft, although current specifications were more stringent.

FSF Editorial Staff

A British-registered Aérospatiale AS 350B, operated by PLM Helicopters Ltd., was conducting an aerial transfer of farmed salmon in Scotland. On a flight to pick up a ground crew member, with an unloaded and unrestrained sling trailing below the aircraft, the tip of one tail-rotor blade separated. Investigators concluded that the end of the sling probably struck the surface of the lake (loch) over which the aircraft was flying and rebounded into the tail rotor, causing the separation of the tail-rotor blade tip.

The resulting out-of-balance forces on the tail rotor caused the tail-rotor gearbox to separate from the tail boom. The helicopter became uncontrollable and struck the shore of Loch Gilp, destroying the aircraft (photo, page 5) and killing the pilot, who was its only occupant.

The accident occurred in darkness. Visibility at the time of the accident was unlimited, with no cloud cover and a light westerly wind.

Despite the fatality, investigators considered the May 5, 1995, accident survivable. The pilot died "because the seat and the restraint systems failed and he remained attached to the aircraft by his headset [cable] under tension, which resulted in his asphyxiation," according to the official accident investigation report by the U.K. Air Accidents Investigation Branch (AAIB).

On the day of the accident, the pilot awakened at 0445 local time. He took off at 0535 to fly a ground handler to the Isle of Jura, off the Scottish coast. The pilot then flew to Ormsary on the mainland to pick up four fishing-industry workers.

Between 0750 and 1100 the pilot carried out his duties of transporting immature salmon, raised in fresh water, to seawater cages where the fish would grow to maturity. The fish were transported in a bucket, similar in size and shape to a large oil drum, that was slung underneath the helicopter and, when loaded, weighed 500 kilograms (1,102 pounds). The sling (Figure 1, page 3) was approximately six meters (19.7 feet) long and comprised a steel hook, 13-millimeter (0.5-inch) diameter steel cable and a five-kilogram (11-pound) steel ball counterweight. This sling was attached via a swivel assembly to a woven nylon springer rope, which was shackled to the underbelly cargo hook. The hook and ball weight were painted orange.

The fish were discharged by the pilot from the specially designed bucket into the seawater cages. Typically, the helicopter and crew were involved in several transfers during

Aérospatiale (Eurocopter)
AS 350 Ecureuil (Squirrel)

The Aérospatiale AS 350B is a conventional helicopter with a rotor of three fiberglass blades that rotate clockwise as viewed from above. Directional control is effected by a two-bladed tail rotor on the right side of the tail boom.

Deliveries of the AS 350B began in March 1978, shortly after certification in the United States of the AS 350C, which was known as the Astar and was marketed only in North America.

The AS 350B, which has two standard bucket seats at the front of the cabin and two two-place bench seats aft, is powered by a single turboshaft engine mounted above the fuselage to the rear of the cabin. Its maximum normal takeoff weight is 1,950 kilograms (4,300 pounds), or 2,100 kilograms (4,630 pounds) with a maximum sling load.

The AS 350B has a maximum cruising speed at sea level of 232 kilometers per hour (125 knots) and a service ceiling of 4,575 meters (15,000 feet). It has a range with maximum fuel at sea level of 700 kilometers (435 miles).

Source: *Jane's All the World's Aircraft*

the day and operated from more than one loading site. Sometimes the pilot took an empty bucket from a sea cage to the next loading site and left it there before returning to complete a task at another loading site. The number of aerial transfers required was determined by the "fish farmers"; the helicopter company management established the flight program and the assets required to complete the job.

At 1200, the pilot turned the aircraft over to a relief pilot. The relief pilot returned at 1630, and the pilots discussed the day's remaining activities. One task was expected to take two hours, the other one hour. "The company plan was for the relief pilot to do the first [task]; however, the pilots agreed between themselves that both tasks would be done by the [accident pilot]," the report said.

The accident pilot started the first of four fish transfers at 1645. Each transfer was expected to take between 25 minutes and 40 minutes, but the task eventually took seven transfers to complete, about one-and-one-half hours longer than planned.

At 1955, the pilot took off on the seventh transfer. After this transfer was finished, he dropped off the empty salmon bucket but retained the six-meter sling that the bucket had been attached to. The pilot then landed and "without shutting down the engine, got out of the helicopter to talk to a group of people who were waiting with a lorry [truck] load of fish for transfer. ... [The pilot] informed the workers that he would return in five minutes and flew off with the unloaded and unrestrained sling below the helicopter to fetch his ground crewman," the report said.

Minutes later, witnesses reported that the helicopter was seen spinning. One witness saw the helicopter "yawing rapidly to the left and right without completing a revolution, and at the same time rolling and pitching. These multiple motions took place in two [seconds] to three seconds and within a small volume of airspace," the report said. The witness also saw a "long black object fly off the helicopter, and the helicopter then spun around through at least two complete revolutions without losing height" and dropped nose-first into the ground.

The aircraft struck the ground with little forward speed and a moderately high descent rate, while banked to the right, pitched nose-down and yawing to the left. The area of impact was rocky and initial ground contact caused the right landing-gear skid to detach. "The aircraft then rolled right, contacting the ground with the main rotor blades and the right horizontal stabilizer, before inverting," the report said. "It came to rest on its left side [seven meters (23 feet)] from the initial ground-impact point."

Pieces of the helicopter had separated from the aircraft before it struck the ground. Scattered between 55 meters (180 feet) and 85 meters (279 feet) from the original impact site of the helicopter were the tail-rotor gearbox cover, the aft 1.5 meters (4.9 feet) of the tail boom with the vertical fins attached, electrical cables from within the tail boom, the tail-rotor long-drive shaft and the window from the right door of the cabin.

The tail-rotor gearbox with the tail rotor attached and the missing tip of one tail-rotor blade were found embedded in the ground 35 meters (115 feet) north of the initial impact point. Other parts of the helicopter were never recovered, including the underslung load sling, which was probably deliberately jettisoned during the emergency; part of the small tailcone fairing from the aft end of the tail boom; and the detached parts of the tail-rotor blade.

Examination of the wreckage revealed that one tail-rotor blade remained undamaged while the other blade sustained considerable damage. The outboard 35 centimeters (13.8 inches) of one tail-rotor blade's leading edge had been flattened and deformed. "The outboard three centimeters (1.2 inches) of the titanium leading-edge strip had fractured off, consistent with a heavy leading-edge strike near the tip," the report said. "None of the separated parts of the blade were recovered. Paint smudges on most of the blade leading edge and markings on both upper and lower fins provided clear evidence that the blade had struck the fins while rotating."

The pilot's seat (Figure 2, page 4) had separated from the helicopter and was found on the ground adjacent to the cabin. The seat was tethered to the aircraft by the remains of the pilot's harness. The unoccupied left forward seat had also detached from the cabin floor.

A doctor who arrived at the site shortly after the accident said that "the pilot initially had been found with his helmet on and fastened and with part of his weight forcibly restrained by the helmet chin strap by virtue of tension in the headset [cable], which remained plugged into the aircraft socket," the report said.

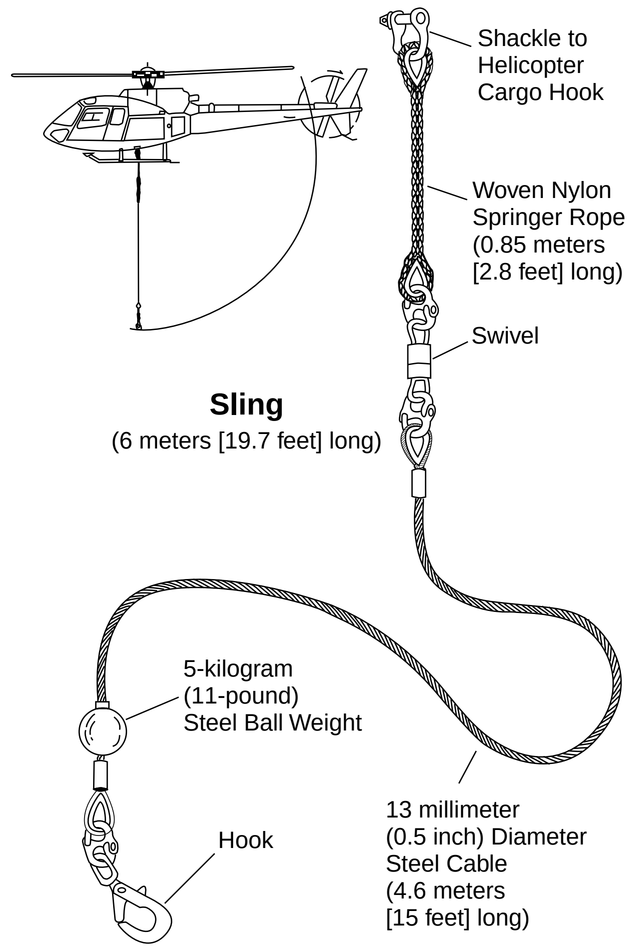
The helmet, with a Velcro-fastened chin strap, contained a radio headset. The electrical cable for the headset ended in a standard single plug that fit into a socket mounted rigidly on the side of the collective quadrant, just above the cabin floor level. The socket faced forward, angled 35 degrees upward from to the floor. The helmet, the headset, its cable and plug were all found intact after the accident.

The report said that the helmet provided a high degree of protection but that the injuries sustained by the pilot, including a heavy blow to the forehead, made it highly likely that the pilot "was unconscious and unable to make any effort to release his helmet," the report said.

The cabin sustained moderate damage. "Most of the panels forming the above-floor cabin structure broke up and detached," the report said. "The panels were of relatively lightweight plastic construction and it did not appear that they would provide a high level of protection to cabin occupants in a crash situation."

Although the seat had detached from the floor, investigators found that the pilot had not been subjected to extreme reaction loads from the lap straps or shoulder straps. The report

Sling Used with Accident Helicopter, May 5, 1995



Source: U.K. Air Accidents Investigation Branch

Figure 1

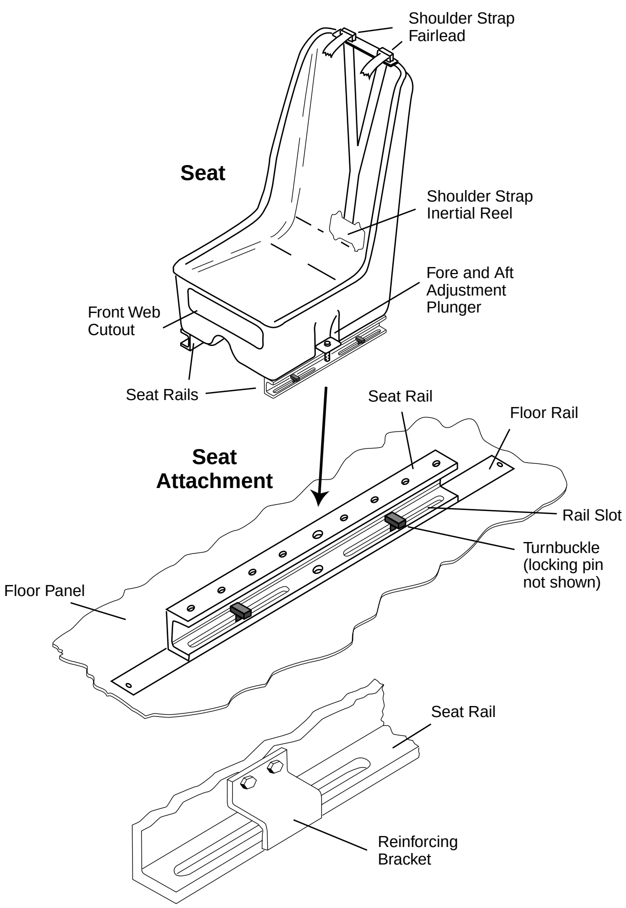
considered the seat detachment "unsurprising in view of the apparent lack of robustness of the seat and its attachments."

The manufacturer was not aware of any situations in which seats of the type used in the accident aircraft had failed in normal service or in survivable accidents. Nevertheless, the U.K. Civil Aviation Authority (CAA) database listed three failures of this type of seat.

The operator of one of the aircraft listed in the CAA database informed the CAA in 1993 that it had "reservations about the crashworthiness of the seat type ... [and] discussed its concern with the manufacturer's agent and subsequently with the manufacturer," the report said.

Modifications to strengthen the seat and attachments in the AS 350 had been published by Aérospatiale in a service bulletin (SB) on Aug. 2, 1984, with a revision issued on April 2, 1987.

Pilot's Seat and Attachment On Accident Aircraft



Seat Rail Reinforcing Modification
per service bulletin (not incorporated on accident aircraft)

Source: U.K. Air Accidents Investigation Branch

Figure 2

The SB revision included "the addition of bonded reinforcement strips at the bucket/base junction and the installation of rail reinforcements," the report said (Figure 2).

The rail reinforcements required the addition of an "angled bracket bolted to the seat rail web at the center of each slot and overlapping the outer edge of the rail," the report said. "No classification was entered on the SB, reportedly signifying that the manufacturer classified the modification as optional." The report said that "the modification had clear implications of survivability enhancement and no information was available as to why the manufacturer had not classified it as mandatory."

The initial application for certification of the AS 350 was made by Aérospatiale to the French Direction Generale de L'Aviation Civile (DGAC) on June 17, 1974. DGAC certification of the original version, the AS 350C, was granted on Sept. 2, 1977. This was extended to the AS 350B on Oct. 27, 1977. British type certification of the AS 350B in the transport category was granted by the CAA in May 1978, on the basis of the DGAC certification and additional CAA requirements.

"For this certification, the CAA considered the British Civil Airworthiness Requirement (BCAR) issue applicable at the date of the initial application for French type certification [on June 17, 1974] to be relevant, in accordance with their normal practice," the report said.

Under those criteria, the pilot's seat had to meet static load-factor certification requirements of BCAR Issue 3, which was introduced in 1966 (Table 1, page 5).

BCAR Issue 2, a 1953 specification, had "required the BCAR static load factors to be multiplied by 1.2 for testing 'to allow for the fact that a limited number of seats will be tested,'" the report said. But BCAR Issue 3, which was in effect at the time of the initial application to the DGAC in 1974, did not include the requirements under BCAR Issue 2. This omission was rectified in a subsequent revision in 1975 — after the initial application for certification of the AS 350 by Aérospatiale. This 1975 revision required seat local attachments to withstand 1.33 times the accelerations prescribed in the 1966 BCAR. Neither the 1.2 multiplier nor the 1.33 multiplier requirement was applied to the AS 350.

U.S. certification requirements were specified under Federal Aviation Regulations (FARs) Part 27.561, Amendment 10 (shown in Table 1) for the original AS 350C (and, by extension, to the AS 350B).

A test performed in 1978 of a sample high-back seat similar to the type fitted to the accident aircraft withstood load factors of 6 G down, 3 G up, 3 G sideways and 6 G forward. A final forward test resulted in significant failure of the seat at 9.5 G and the test was stopped at 10 G without harness failure. "The seat test loads thus exceeded the FARs applicable at the time of DGAC certification and met or exceeded the BCARs considered by the CAA to be applicable to U.K. certification," the report said.

In 1989, the FARs revised seat loading requirements (FARs Part 27.561, Amendment 25, shown in Table 1). These regulations required that the seat and harness withstand loads of 20 G down, 4 G up, 8 G sideways and 16 G forward without failure.

"The CAA reported that none of the subsequent upgraded requirements [the 1975 revision to BCAR 3 requiring testing to 1.33 times the designated load factor or FARs Part 27.561, Amendment 25] have been applied to the AS 350 because of the normal policy of airworthiness authorities not to require the application of such improvements where they occurred after the date of application for type certification in the country of origin," the report said.

Table 1
Comparison of Pilot Seat Static Load Factors, Showing Early Test Results and Specifications Under Various Certification Requirements

Direction	Static Load Factor – G				
	AS 350 Seat Tests*	BCAR Issue 3 1966	BCAR Revision 1975 (x1.33)	FARs Part 27.561 Amendment 10	FARs Part 27.561 Amendment 25
Down	6	6	7	4	20
Up	3	3	4	1.5	4
Sideways	3 (right)	3	4	2	8
Backward	—	3	4	—	—
Forward	6	4	5.3	4	16

*Conducted in 1978. BCAR = British Civil Airworthiness Requirement FARs = U.S. Federal Aviation Regulations

Source: U.K. Air Accidents Investigation Branch

Deformation of the seat "would have provided some load attenuation for the pilot, particularly in the downward sense, if the seat had remained attached, whereas its detachment could have allowed the pilot to make violent contact with parts of the helicopter," the report said. If the inertial reel for the shoulder straps had been mounted directly to the floor, the report said, consequences of seat detachment would then have been less serious because "the shoulder straps would at least remain attached to the aircraft in the event of the seat breaking free. …

"The pilot's harness release fitting remained fastened but the left lap strap released from its floor attachment shackle as a result of failure of the stitching through the turnback that formed the end loop of the short strap," the report said. No signs of extreme loading were apparent elsewhere on the harness. Further, the pilot had no markings on his body that were characteristic of high harness restraint loads, suggesting that "the stitching failure had resulted without the lap strap having been grossly overloaded," the report said.

The accident aircraft, an Aérospatiale AS 350B, struck the ground at a moderately high descent rate, banking to the right and nose-down. The main rotor blades contacted the ground and the aircraft inverted, coming to rest on its left side seven meters (23 feet) from the initial impact point.

Both straps had been replaced over the years. When the left strap had been repaired was unknown; the right strap had been replaced in 1980. Both appeared to be in similar condition and no signs were found to indicate that the repair to the lap strap that failed in the accident had significantly affected its strength.

The detachment of the seat may have also contributed to the failure of the lap strap. The maximum load on the lap strap occurred when the seat detached. Any restraint provided to the pilot by direct contact with the seat and shoulder harness was lost, which left only the lap strap to react to the load of the pilot and his seat. Testing revealed that the used straps failed at between 63 percent and 79 percent of the load at which the unused straps broke. "It does appear likely that the [strap] failure was a crucial factor in the pilot's death following what was a potentially survivable accident. ...

"The effectiveness of a visual inspection in determining the strength of a stitched fabric component is clearly limited and yet this is the only means employed to assess the fitness of a harness for continued service."

Investigators reviewed the role played by the headset cable and helmet in the accident. "It was clear that the failure of the headset-[cable] plug to disconnect from the helicopter socket during the accident sequence, or of the assembly to break, had left the pilot forcibly restrained by his helmet chin strap, causing his tragic asphyxiation," the report said.

Tests were conducted on a headset cable assembly similar to the one used in the accident aircraft to determine the force necessary for the assembly to fail. At an angle of 90 degrees from the socket forward axis, a force of over 45 kilograms (100 pounds) did not cause the assembly to fail.

"The accident was brought about by a sequence of events but there can be little doubt that the event which made it inevitable was separation of the tail-rotor gearbox," the report said. Because of the close location of the gearbox and tail-rotor blade to the rest of the wreckage, it was concluded that the separation happened seconds before the helicopter struck the ground. After the gearbox broke away, there was no tail-rotor force to counteract the torque of the main rotor, and the helicopter would have begun to spin around its main rotor. Reducing engine power and executing a forced landing was the only way to contain this situation. "That this was attempted is fully consistent with all the evidence available," the report said.

The in-flight fracture of the tail boom was consistent with the effects of the heavy blade strike on the lower fin. "It was also apparent," the report said, "from the tail-rotor strikes on the fins and the machining damage to the tail-rotor control rod by the gearbox input coupling, that the system had operated briefly with the tail-rotor gearbox displaced from its normal position while the tail rotor had been rotating at high speed. Relative movement between the gearbox and the structure would have produced uncommanded changes in blade-pitch angles because of the pitch-control rod geometry. This in turn would have caused the uncontrolled yawing and rolling reported by many witnesses. ...

"During this phase the control difficulties were probably so severe that the commander was unable to attempt any form of 'controlled' crash landing until the tail rotor had broken free from the tail boom." Because of the aircraft's altitude and speed and the rocky landing area "a very hard landing in an unusual attitude was unavoidable," the report said.

The aircraft was not fitted with a flight data recorder (FDR) or a cockpit voice recorder (CVR), nor was there a requirement for either to be installed. The aircraft was not in contact with air traffic control (ATC) and was below ATC radar coverage.

The pilot, 52, held an airline transport pilot certificate and had a total of 7,682 hours of flight time, of which 98 hours were in the AS 350B. He had received a line check on March 2, 1995, and an underslung load check on April 3, 1995.

Before being hired by PLM Helicopters, the pilot spent five years spraying crops and patrolling electrical lines. Later, he became a police aviation-support pilot. He listed 400 hours of experience in external-load operations in his application with the company. "His training records provided by the company revealed that his technical and procedural knowledge was excellent and that he had been assessed as competent to carry out external load operations," the report said.

On the day of the accident, the pilot had planned split duty periods. The first period was to begin at 0505 and finish at 1215. The second period was to begin at 1615. For the intervening four hours, company policy stipulated that the pilot should rest in a "quiet and comfortable place, not open to the public, if available," the report said.

After working for the first period, the pilot used his rest time to drive 51 kilometers (32 miles) to buy food. "The drive ... would have taken about an hour and cannot realistically be considered as taking rest," the report said. He then drove another 16 kilometers (10 miles) to a new location to wait for the arrival of the relief pilot. The report said that "the environment in which he rested, a shed, was hardly ideal ... ."

"The accident was brought about by a sequence of events but there can be little doubt that the event which made it inevitable was separation of the tail-rotor gearbox."

The pilot began waiting at 1400 for the aircraft to arrive. When it arrived at 1630, two-and-one-half hours later, the pilot "might have preferred to resume flying rather than wait another two hours with only a shed or a vehicle in which to rest," the report said. "The pilot had been unable to take proper rest for nearly 16 hours since he arose that morning. Coming so soon after another early start and very long day [the pilot] may have been suffering from some of the effects of fatigue [that] possibly contributed to the accident." (On the day before the accident, the pilot began work at 0555 and completed numerous fish transfers during nearly eight hours of flying. He finished his duty at 1815 and went to bed at 2200.)

The operator's U.K. CAA-approved flight and duty time schedule included a maximum 12 hours of duty time and seven hours flight time per day. At the time of the accident the pilot had been on duty for 11 hours and 10 minutes and had exceeded the seven-hour flight-time limitation.

" ... The salmon transport season is short and the work competitive; this naturally leads to commercial pressures on the operator to obtain maximum work from its aircraft and pilots for a short burst of a few weeks," the report said. " ... The salmon [transported by the helicopters] are delicate and one lift of fish can be worth £10,000 [$16,100] to the customer. The prospect of dead or damaged fish would harm the relationship between customer and operator and so, if there is a lorry load of fish to transfer, a pilot will naturally feel some pressure to complete a task even if this means turning a blind eye to the letter of the law or company regulations."

The report also said that "in the days leading up to this accident, there was evidence that the [pilot] had begun to deviate from company instructions on several matters when operating away from the main base," the report said. The pilot transported workers in the helicopter across the Sound of Jura without a life raft on board, which, according to the U.K. CAA regulations, was illegal. "He had on more than one occasion left the helicopter unmanned with the rotors running," the report said. "Despite having had the dubious practice drawn to his attention by ground crew, he had flown several transit sectors with an empty sling attached."

The report said that a number of other underslung operations had not been required to produce flight-time limitations approved by the U.K. CAA. This was contrary to the U.K Air Navigation Order (ANO) that requires companies involved solely in aerial work activities to have flight-time limitations.

The accident AS 350B was estimated to have been traveling between 72 kilometers per hour (39 knots) and 120 kilometers per hour (65 knots). Because the pilot was traveling below the aircraft's normal fast-cruise speed of 203 kilometers per hour (110 knots), he "was probably aware that the sling was still attached," the report said.

A member of the operator's ground crew told investigators that the pilot enjoyed low flying over the loch. "There was nothing illegal or improper in doing so, provided that he avoided overflying any vessels, but it was quite unnecessary," the report said. When the wind is light or nonexistent and the water is sheltered — conditions that were reported the day the accident aircraft transited the loch — the sea can be smooth and glasslike, making the judgment of height and speed difficult even for the experienced pilot. "In these conditions an aircraft can slowly descend or 'drift down' towards the surface without the pilot's noticing the loss of height," the report said. "It is difficult to define any particular *estimated* height above which the aircraft would be safe and below which it would be at risk; the hazard is both gradual and subjective."

Investigators found that although the flight manual cited a maximum speed limit of 148 kilometers per hour for "a load on the hook," it mentioned no limitations concerning flight with an unballasted sling. Further, no written instructions to company pilots explained that even if the sling had nothing attached to the lower hook, pilots were to consider the sling as an underslung load.

In its investigation of an accident to an AS 350B2, a similar model, the AAIB learned that the AS 350B2 flight manual contained an underlined recommendation: "Never fly away with an empty net or an unballasted sling." There was no such warning in the flight manual for the AS 350B. The report said that after this accident, "the operator issued a notice to pilots stating that 'pilots shall ensure that, whenever possible, the aircraft does not transit with an unballasted sling attached to the cargo hook.'"

The AAIB concluded that the separation of the tip of one tail-rotor blade and subsequent tail-rotor gearbox failure was precipitated by "[the weighted hook on] the end of the sling probably contact[ing] the surface of the loch and rebound[ing] into the tail rotor ... ."

Causal factors included the pilot's decision to fly low over the water with a sling attached to the helicopter; the pilot's erroneous judgment of the aircraft's height above the water, which may have been affected by the calm sea and weather conditions; possible pilot fatigue, the result of having exceeded both permitted duty time (on the previous day) and flight time; and pressure on the pilot to complete the work.

" … Relatively recent, and indeed new, aircraft remain fitted with equipment crucial to crash survival that is qualified to airworthiness requirements that were superseded many years previously … ."

Concerning the pilot's seat certification requirements that had applied to the accident aircraft, the report said: "The approach that no improvement is necessary in such a case because original certification requirements were met does not seem reasonable or to reflect the likely expectation of those using the aircraft. In the absence of such improvement, relatively recent, and indeed new, aircraft remain fitted with equipment crucial to crash survival that is qualified to airworthiness requirements that were superseded many years previously; in this case to requirements last revised almost 42 years before the accident, that had been upgraded before U.K. type certification was granted and that are grossly inferior to current requirements by a factor of three or four.

"While accepting that the required standards cannot protect against all eventualities, it could reasonably be expected that the occupants' seats would remain intact in a case such as this, where there were no signs of massive shock loading and where the aircraft was substantially intact with the pilot alive and without immediately life-threatening injuries. ... That both the pilot's seat and his harness failed could have been influenced to some extent by in-service deterioration, but the evidence also strongly indicated that the crash load requirements applied had been inadequate." It added that loads "greatly in excess of the [loads specified in the original certification requirements] are likely to be experienced in many survivable aircraft accidents."

The report concluded with the following safety recommendations, among others:

- "The CAA should either ensure compliance with the ANO requiring air transport undertakings engaged solely in aerial work activities to have a flight-time limitations scheme or review this requirement;
- "The operator should explore methods of refining techniques for estimating the time required to complete a given number of lifts;
- "The operator should prohibit transit flights with an unballasted sling and discourage transit flights with a trailing sling in the aerial work section of the company's operations manual;
- "Eurocopter [the company formed jointly by Aérospatiale and Daimler-Benz Aerospace] should clarify its stipulated and recommended procedures and limitations for flight with an external load and place the amended text in the appropriate supplement to the official flight manual;
- "The CAA, in conjunction with the DGAC [Direction Generale de L'Aviation Civil], should require reassessment of the crashworthiness of the AS 350 forward seat and its floor attachments, including consideration of seat rail reinforcement, relevant aspects of the helicopter bottom-structure strength and floor mounting of the shoulder strap inertial reel, with the aim of preventing seat detachment from the floor in a survivable impact. A similar assessment should be made for the AS 355 helicopter, which has an identical seat;
- "The CAA should give detailed consideration to requiring a program of sample testing of aircraft harnesses aimed at establishing their fitness for continued use and, if necessary, imposing a life limitation;
- "The CAA should assess the need for measures aimed at ensuring that headset [cables] readily disconnect if tensioned during an accident." This issue is relevant to other aircraft and a solution is considered simple and inexpensive, the report said. Eurocopter intends to issue a service letter to customers that recommends the "insertion of a small flexible extension [cable] between the helmet [cable] and its receptacle in the cabin"; and,
- The CAA should "revise [its] procedures to ensure that evidence of unsatisfactory in-service performance of components in safety-critical areas reported to the CAA results in investigation by the authority. Where a potential hazard is identified this should result in significant improvements to those components, even where the requirements in force at the time of type certification were demonstrated to have been met."♦

Editorial note: This article was adapted from *Report on the Accident to AS 350B Squirrel, G-PLMA near Lochgilphead, Argyll, Scotland on 5 May 1995*, Aircraft Accident Report no. 4/96 prepared by the U.K. Air Accidents Investigation Branch. The 69-page report includes figures and illustrations.

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