FINAL REPORT

Formal Report No: 2010-009
State File No: IRL00909023
Published: 05/08/2010

Operator:	European Helicopter Academy Flight Training Organisation (FTO)
Manufacturer:	Schweizer Aircraft Corporation
Model:	Model 269C-1
Nationality:	Ireland
Registration:	EI-CZL
Location:	Near Kilshanchoe, Co. Kildare at 53° 22' N, 006° 52' W
Date/Time (UTC)[1]:	1 April 2009 @ approximately 16.34 hrs

SYNOPSIS

The helicopter departed Weston Airport (EIWT) at 16.02 hrs on a training flight with an Instructor and Student on board. The Instructor stated to Dublin Air Traffic Control (ATC) that his intention was to operate south of Enfield between 1,000 and 2,000 ft. The last communication with Dublin ATC was at 16.12 hrs as the helicopter transited into Class G airspace[2] outside the Dublin Control Zone (CTR). Following this exchange, no further communication was made. During a probable low-level transition after a practice autorotation (**Section 1.18.1 Autorotation**), the helicopter impacted disused electrical power lines at Kilshanchoe, Co. Kildare. An alert was raised following enquires made by family members the following morning. The wreckage of the helicopter was located the following morning by an Irish Coast Guard helicopter. The accident was not survivable and both occupants were fatally injured. There was no fire.

NOTIFICATION

Dublin ATC notified the AAIU at 11.35 hrs on 2 April 2009, the Inspector-on-Call (IOC) arrived on scene at 12.55 hrs, and was later joined by two additional Inspectors of Air Accidents. Following a preliminary inspection of the wreckage, a survey was made of the accident site. The wreckage was removed later that day to the AAIU facility at Gormanston, Co. Meath for further technical examination.

On 2 April 2009, in accordance with the provisions of S.I. 205 of 1997, the Chief Inspector of Air Accidents appointed Mr. Leo Murray as the Investigator-in-Charge (IIC) to conduct an Investigation into this accident and prepare a Formal Report.

[1] **UTC**:Universal Time Co-ordinated, equivalent to local summer time minus 1 hour.
[2] **Class G airspace**:All uncontrolled airspace within the Shannon FIR except for those areas designated as Class A and Class C.

1. FACTUAL INFORMATION

1.1 History of the Flight

The helicopter was being operated by a flight training school, an Irish Aviation Authority (IAA) approved FTO. On the day of the accident, the FTO commenced operations at 08.00 hrs, with two flights in EI-CZL being carried out by the Instructor prior to the accident flight. One person was present in the office of the FTO at EIWT when the Student and Instructor arrived for the flight on the evening of 1 April 2009. They spoke briefly to the person on duty who stated that the Pilots were in very good form and looking forward to the flight. The operations office was later closed at approximately 16.30 hrs. The FTO utilised a Flight Authorisation Sheet, which should indicate the persons on board, the exercises planned for the intended flight, the expected departure time and the expected duration of the flight. No entry was made regarding the accident flight on this sheet.

The helicopter departed EIWT at 16.02 hrs and routed south of Maynooth transferring to Dublin ATC when passing Kilcock. Radar returns indicate that the helicopter, at an altitude of 2,200 ft, positioned to an area in Class G airspace, south of Enfield over a wide expanse of bog land where a series of wide turns were made. After manoeuvring in the area for several minutes, a steep descent was made in a south-westerly direction. The helicopter disappeared off radar at 16.27:20 hrs as it descended below 1,000 ft. No radar returns were evident for a further three and a half minutes. The helicopter re-appeared on radar at 16.31:50 hrs and climbed up to an altitude of 1,600 ft. A wide turn was carried out, to the right, when the helicopter again entered a steep descent, disappearing off radar as it descended below 1,000 ft. The time was 16.33:50 hrs. The helicopter impacted the power lines at a height of approximately 30 feet.

1.1.1 Subsequent Events

On 1 April 2009, Weston Air Traffic Services (ATS) recorded the last air traffic movement, an arriving helicopter, at 19.20 hrs. The Air Traffic Control Officer (ATCO) at EIWT closed the watch at 19.30 hrs at the end of Visual Flight Rules (VFR) operations, and as the FTO Operations Office had closed earlier at 16.30 hrs, no alert was raised regarding the overdue helicopter.

The following morning, on 2 April 2009, members of the Instructor's family became concerned, as the Instructor had not arrived home the previous evening and could not be contacted by telephone. Enquiries were made that morning by family members to the Gardaí, the FTO, and Weston ATS. Initially it was thought by Weston ATS that the helicopter had gone to Cork, as it had the previous day, but it was soon realised that the helicopter was missing. Weston ATS informed Dublin ATC of the overdue helicopter and a search was initiated. The Irish Coast Guard dispatched its Dublin based Sikorsky S.61 helicopter at 11.02 hrs to conduct a search in conjunction with an Irish Air Corps transport helicopter.

The accident site was located at 11.27 hrs in an area of machined bog land 2.5 km southeast of the village of Kilshanchoe by the Irish Coast Guard helicopter.

The Coast Guard winchman, who was first on scene, determined both occupants had received fatal injuries and this was communicated to Dublin ATC. The winchman remained at the scene until the ground-based Emergency Services arrived. The remains of the Instructor and Student were removed from the wreckage by the Emergency Services and brought to Naas General Hospital.

1.1.2 Witnesses to the accident

1.1.2.1 General

Three witnesses saw the helicopter manoeuvring prior to the accident and another witness heard the impact, but did not actually see the helicopter. The site of the accident and location of the four witnesses is illustrated in **Figure No. 1**.

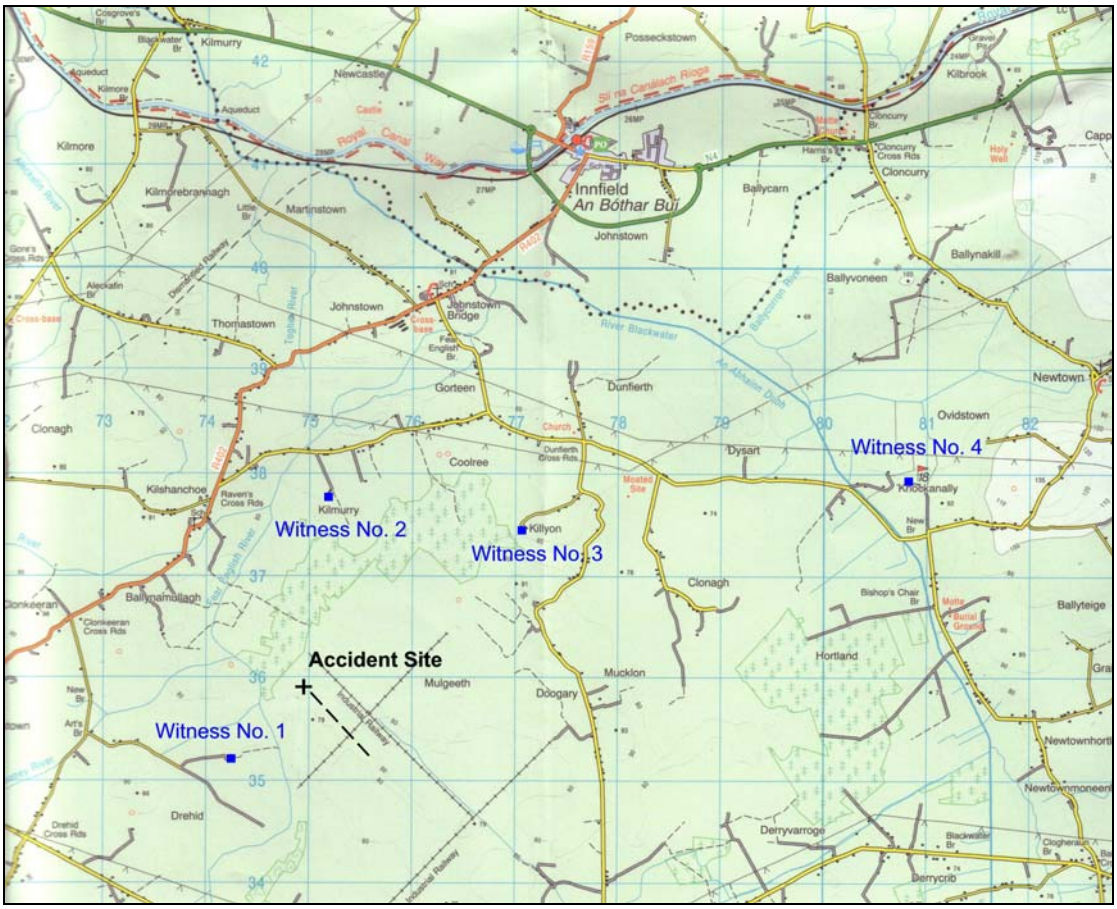

Figure No. 1: Location of witnesses (*based on Ordnance Survey 1:50 000*)

1.1.2.2 Witness No. 1

This Witness was situated at Drehid 1 km southwest of the accident site. Some time after 16.15 hrs this witness saw the helicopter '*drop down quickly*' out of view. The witness then went into a shed on his farm. He did not hear any impact. The following day he saw the Irish Coast Guard helicopter in the area, and he contacted the Emergency Services directing them to where he had seen the helicopter operating. The witness stated that helicopters of various types were routinely operating at low level in that area of the bog.

1.1.2.3 Witness No. 2

This Witness was situated at Kilmurry, 2.5 km north of the accident site. She was on her porch and heard the helicopter operating nearby. She heard what she thought was the sound of trees breaking and looked in that direction, thinking that there might have been an accident. As there was no explosion or smoke evident, she thought she might have been mistaken about the noise. At no time did she see the helicopter.

1.1.2.4 Witness No. 3

This Witness was working on a tractor at his home 2.8 km northeast of the accident site. He stated that between 16.30 and 17.00 hrs he saw the helicopter going west at about 400 to 500 ft. It then remained stationary at this height for some time before making a large circle and coming back over his house. He recognised the helicopter as '*they are always training there*'. '*It descended at the far side of the field about 100 ft up, made a sound like spluttering, like when a helicopter is lifting.'* The helicopter went out of view behind trees. He did not hear any impact and only became aware that it had crashed when he saw the TV news the following day. He had seen similar helicopters training there in the past, descending to low level and on one occasion he thought a helicopter might have landed, but then saw that it was hovering just above the ground.

1.1.2.5 Witness No. 4

This Witness held a PPL (H)[3] and had flown with the FTO two years previously. At the time of the accident he was located at Knockanally golf course, 6.5 km east of the accident site. The position was elevated with a good general view of the local area. At about 16.30 hrs he witnessed the helicopter doing an autorotation *'from about 2,000 ft'* and *'did not see it come up again'*. He did not see or hear any impact.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Total in aircraft	Others
Fatal	2	0	2	0
Serious	0	0	0	0
Minor	0	0	0	0
None	0	0	0	-

1.3 Damage to Aircraft

The helicopter was destroyed.

1.4 Other Damage

Damage to disused electrical power lines.

[3] **PPL (H)**: Private Pilot Licence (Helicopters)

1.5 Personnel Information

1.5.1 Instructor

Personal Details:	Male, aged 34 years
Licence Type:	UK JAA CPL (Rotorcraft)[4]
Initial Licence Issue:	4 December 2007
Licence Renewal:	3 December 2012
Instructor Rating Initial Issue:	13 May 2008
Medical Certificate:	Class I, expiry 25 May 2009

The Instructor commenced a JAA integrated CPL(H) course on 11 September 2006 at a flight academy in the United States which he completed on 10 August 2007. He then completed courses for an FAA Commercial Certificate, FAA Instrument Rating, FAA Certified Flight Instructor (FAA CFI), and FAA Certified Flight Instructor Instrument (FAA CFII). He was then employed by the academy as an FAA CFI. He then completed a JAA FI(H) standardisation course and remained employed with the Academy until 26 September 2008. In addition the Instructor also completed JAA type rating courses on the Robinson R22 and Bell 206. At the time of the accident, he held a UK JAA CPL (Rotorcraft) and Flight Instructor (FI)Rating. In November 2008, he carried out a familiarisation flight from Weston accompanied by the Chief Instructor of the FTO. In December 2008, he attended a flight academy in the United Kingdom where he completed a Bell 206 Type Rating. The Instructor commenced working for the FTO, on a contract basis, in February 2009. On 6 February 2009 the Instructor underwent an LPC[5] and checkout by the Head of Training (HT). Neither this flight, nor the familiarisation flight in November 2008, were conducted on or near the accident site nor was this area identified to the Instructor for operations.

At the time of the accident, the Instructor had a total of 729 hours of flying time, all on helicopters, of which 714 hrs were on the Schweizer 269C. The Instructor's personal logbook was completed up to 28 March 2009. Exercises completed on each flight in the Instructors logbook were noted using a general notation system. For example: 'Exercise 7' (Basic Autorotation), and 'Exercise 17' (Advanced Autorotation), these exercises would be equivalent to Exercises 1-11 and 1-12 in the FTO syllabus. Checking the records of the FTO and the Instructors logbook, showed he flew a total of 47 hours in the previous 90 days, 18 hours in the previous 28 days, and 2 hours 5 minutes in the 24 hour period prior to the accident flight.

1.5.2 Student

Personal Details:	Male, aged 24 years
Licence Type:	Irish JAA SPL (Rotorcraft)[6]
Initial Licence Issue:	9 July 2008
Licence Renewal:	8 July 2013
Medical Certificate:	Class I, expiry 10 January 2009

[4] **JAA CPL (Rotorcraft)**: Joint Aviation Authorities, Commercial Pilot Licence, (Helicopters).
[5] **LPC**: Licence Proficiency Check.
[6] **JAA SPL (Rotorcraft)**: Joint Aviation Authorities, Student Pilot's Licence (Helicopters).

The Student had commenced flight training on 7 June 2008, and at the time of the accident had accumulated total of 18 hours 20 minutes of flying time, all of which was conducted with the FTO on the Schweizer 269C. His training records indicate that he had made three solo flights between 14 August 2008 and 12 October 2008.

The Instructor and Student had flown together on three occasions prior to the accident flight. On the last of these flights, Exercise 1-11, '*Introduction to autorotations from altitude and hovering autorotations*' (basic autorotations) were carried out.

1.6 Aircraft Information

1.6.1 Leading Particulars

Aircraft type designation:	Schweizer 269C-1
Manufacturer:	Schweizer Aircraft Corporation
Constructor's number:	0147
Year of manufacture:	2002
Certificate of registration:	Issued 24 July 2007
Certificate of airworthiness:	Issued 27 May 2008
Total airframe hours[7]:	739 hours
Engines:	1 x Lycoming HIO-360-G1A
Max authorised take-off weight:	1,750 lbs (794 kg)
Estimated take-off weight:	1,720 lbs
Estimated weight at time of accident:	1,673 lbs
Centre of Gravity at time of accident:	Longitudinal: 96.8 inches Lateral: - 0.8 inches

Calculations to establish the estimated weight and balance of EI-CZL at take-off and at the time of the accident are set out in **Appendix A**. The helicopter was within weight and balance limits during the accident flight.

1.6.2 General Information

The Schweizer Model 269C-1 is a two-seat, light utility helicopter intended primarily for the training role, originally built as the Hughes Model 269. The basic version is powered by a Textron Lycoming HO-360-C1A normally aspirated piston engine; rated at 180 hp, and driving a single, three-bladed main rotor and a two-bladed tail rotor. The basic version is marketed commercially as the Schweizer 300CB. Versions powered with fuel injected engines are marketed as the 300CBi.

[7] **Total airframe hours**: Extracted from Aircraft Logbook and reflects flight time in the air.

EI-CZL was powered by a Lycoming HIO-360-G1A fuel injected engine. Engine power is transmitted through a belt drive transmission assembly to the main transmission and rotor and to the tail rotor drive shaft. The belt drive assembly incorporates an overunning freewheel to permit autorotation without drag from the driving belts and engine. The main rotor shaft is not secured in the main gearbox, as it is a 'floating spline' arrangement. The main rotor shaft has a thrust bearing mounted near the top of the shaft just under the swashplate. This bearing is mounted into a steel cup that is bonded and fastened to the magnesium mast. A thrust-bearing nut is concentric to the shaft and secures the shaft/bearing into the cup at the top of the mast. The mast has three sets of lugs that attach to the main frame by steel struts.

The fuselage, with a central tubular steel frame, forms the basic load-carrying structure of the helicopter. The forward section comprises the pilot's compartment and contains two seats equipped with dual controls. The pilot-in-command position is on the right side. However, during instructional flying a student will normally occupy the right seat and the Instructor will occupy the left.

1.6.3 Maintenance Information

EI-CZL was properly registered in the State and had a valid Certificate of Airworthiness at the time of the accident. The aircraft was maintained in accordance with an Approved Maintenance Programme. The helicopter had a Technical Log in which details of each flight undertaken were recorded, including flight times and fuel uplifts. The time of the next scheduled maintenance check was noted on each page, to ensure that the helicopter was not inadvertently flown beyond its allowable hours. Also included was a '*Defect Rectification and Maintenance Record*'.

Inspection checks carried out on EI-CZL since 24 July 2007:

Inspection Completed:	Date:	Airframe/Engine Hours:
25 hour	24 July 2007	525.3 hours
50 hour	21 August 2007	525.3 hours (no flights made)
600 hour (Annual)	22 February 2008	574.7 hours
50 hour	26 August 2008	596.1 hours
100 hour	19 November 2008	630.6 hours
25 hour	18 December 2008	654.2 hours
50 hour	17 February 2009	683.2 hours
200 hour (Annual)	19 March 2009	725.7 hours

1.6.4 Helicopter Technical Log

If a defect occurs to an aircraft during flight, then such a defect should be entered in the aircraft's Technical Log by the Pilot-in-Command upon landing. Any such defect must be rectified or deferred by suitably qualified engineering personnel before the aircraft can be considered airworthy and suitable for flight. The Technical Log for EI-CZL was examined by the Investigation. No defects were recorded by any pilot in the Technical Logbook of EI-CZL from 7 December 2008 to 1 April 2009, the date of the accident. All pages in the Logbook were numbered sequentially and no pages were missing.

The standard hour-meter recorded 1014.1 hours. Records for the previous flight of EI-CZL obtained from the Helicopter Technical Log show the engine was shut down at 1013.4 hours. This equates to an engine run time of 0.7 hours or 42 minutes. This time is in agreement with the probable flight time of EI-CZL on the accident flight. The second (optional) hour-meter was later recovered and showed a reading of 740.3 hours. The Helicopter Technical Log shows a total of 738.6 hours (flight time) carried forward from 31 March 2009. This indicates a total of 1.7 flight hours during the three flights made by EI-CZL on the day of the accident (**Section 1.18.3 Logging of Flight Hours**).

1.6.5 Ownership of EI-CZL

The helicopter was first registered in Ireland to a private owner on 19 December 2002. Following several changes of ownership, the helicopter was sold in the United Kingdom in February 2006. On 24 July 2007, it was re-registered in Ireland to another private owner who then leased the helicopter to the FTO. The helicopter was operated by the FTO with approval from the IAA.

1.7 Meteorological Information

Met Éireann, the Irish Meteorological Service, provided the following aftercast information regarding the meteorological conditions at Kilshanchoe, Co. Kildare at the time of the accident:

A large anticyclone to the east maintained a slack southerly airflow over the area.

Surface Wind:	130-150 degrees, at 4-7 kts
Wind at 2,000 ft:	190 degrees, at 12 kts
Visibility:	In excess of 10 km
Significant Weather:	Nil
Cloud:	'Broken' at 3,600 ft
Surface Temperatures:	Air temperature 12ºC, Dew Point 5ºC
MSL Pressure:	1023 hectoPascals (hPa)
Freezing level:	Multiple freezing levels between 4,000 ft and 9,000 ft

1.8 Aids to Navigation

EIWT is equipped with a VOR-DME[8] situated on the airfield, which operates on a frequency of 114.700 MHz and is primarily used for conducting instrument approaches to the airfield.

EI-CZL was on a local VFR flight and was being navigated primarily by visual reference to local features. However, EI-CZL was fitted with a Bendix/King '*Skymap IIIC'* GPS as an aid to navigation. The unit relied on a hold-up battery to retain memory information. As the hold-up battery was unserviceable, the Investigation was unable to recover any information from the unit.

[8] **VOR-DME**: VHF Omni Range with distance measuring equipment.

1.9 Communications

The training flight was operated from EIWT, where the FTO was based. While it is situated within the Dublin Control Zone, flights in the Weston Area of Responsibility (AOR) are the responsibility of Weston ATS. The Instructor first contacted Weston ATS on frequency 122.400 MHz at 15.52 hrs when he requested permission for '*engine rotor start for departure to the west*'.

At 16.02 hrs the helicopter was cleared to lift and depart EIWT '*to the west via the VOR*'. The helicopter followed the standard VFR departure to the west, routing to the south of Maynooth. Passing Kilcock, EI-CZL was instructed to contact Dublin ATC on 129.175 MHz. At 16.11:29 hrs the Instructor called Dublin ATC and outlined his intention to '*operate south of Enfield between 1,000 and 2,000 ft'*. This call was advisory only, in that the helicopter was now operating in Class G airspace in the Shannon Flight Information Region (FIR). This was acknowledged by Dublin ATC and was the last communication with the helicopter. No distress or urgency messages from EI-CZL were recorded or overheard. A full transcript of Radiotelephony (R/T) exchanges with Weston and Dublin ATC can be found in **Appendix B**.

The helicopter was fitted with a Mode C[9] Transponder to facilitate identification by ATC on radar. The Transponder was set to ALT (altitude) mode with a code of 7000, the code used for general VFR flights when operating outside controlled airspace.

1.10 Aerodrome Information

1.10.1 Weston Air Traffic Services (ATS)

The rules governing the provision of Air Traffic Services in Ireland are contained in the IAA Rules of the Air Order, 2004 (S.I. No. 72 of 2004). An Aerodrome Control Service is provided at Weston Airport with responsibility for the Weston AOR, situated within the Dublin CTR. Weston Tower is equipped with R/T equipment that operates on a frequency of 122.400 MHz with frequency 119.425 MHz as standby. Two ATCOs were on duty on 1 April 2009; ATCO No. 1 commenced duty at 09.30 hrs. He was joined by a colleague, ATCO No. 2, at 13.00 hrs. Both remained on duty until close of the ATC watch at 19.30 hrs.

1.10.2 Flight Progress Strips (FPS)

Paragraph 2.7 of the Weston Manual Air Traffic Services (MATS) details the use of FPS for all aircraft movements. The flight strips are printed on white paper. The plastic holders used to mount the flight strips were colour coded as follows: blue for flights landing at EIWT, yellow for a flight departing EIWT, and red for a local flight (including training flights). All FPS holders are of the same format, but the boxes are allocated differently according to application. Preparatory entries and those made while the strip is pending are to be made in blue or black ink. Entries when the strip is active are to be made in red.

[9] **Mode C**: Transponder with altitude reporting capability mode.

The FPS used for the accident helicopter was preserved by ATCO No. 2 and given to the Investigation (**Figure No. 2**). It is probable that this FPS was re-used. At the time of the accident, pre-printed FPS were used. Details of each flight were also entered onto the Movements Log (**Section 1.10.3 Flight Plans**). The colour of the strip holder used on the accident flight could not be established with certainty. FPS for aircraft returning to Weston Airport were placed in red holders, however a yellow holder may have used if no red holder was available. It is possible that the ATCO was given an FPS in a yellow holder.

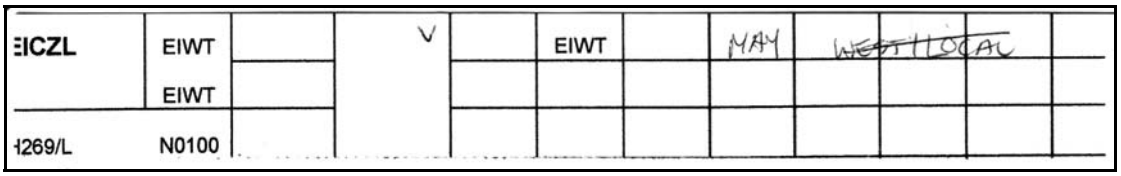

Figure No. 2: Flight Progress Strip used for EI-CZL on 1 April 2009

The FPS above is decoded as follows:

EICZL	-aircraft callsign (in this case the registration mark)
H269/L	-aircraft type designator: Hughes 269 and category: Light
N0100	-cruising speed, 100 kts.
EIWT-EIWT	-point of departure and point of intended landing (Weston)
V	-operating under Visual Flight Rules (VFR)
EIWT	-ICAO four-letter identifier for Weston
	- other details entered in ink

1.10.3 Flight Plans

Paragraph 3.14 of the MATS outlines the requirements regarding filing of flight plans at EIWT:
'*Flight plans are required for flights in the Weston CTR but to reduce unnecessary workload and as a local arrangement; they may be filed via the telephone or in extremis via R/T in abbreviated form as follows:*

- *Details of route or type of exercise;*
- *Elapsed time; SOB (Souls on board)*
- *Endurance*

Paragraph 3.15 of the MATS outlines the requirements regarding the closure of flight plans: *'Whenever a flight plan is filed there is a legal requirement that it must be closed at 'termination of flight or completion of that portion of the flight for which the flight plan was submitted'.*

The IAA publishes a document known as the Aeronautical Information Publication (AIP), which provides general, en-route and aerodrome information to pilots. This publication is also available on the IAA website and is termed the Integrated Aeronautical Information Package (IAIP). Regarding operation at EIWT, filing of a flight plan is mandatory and all aircraft must be equipped with a Mode C Transponder.

1.10.4 Daily Log Book

Regarding the keeping of records the MATS states: '*A daily Log Book will be kept in the Control Tower in which entries shall be made by the duty Air Traffic Control Officer (ATCO) of significant occurrences and the routine events of a tour of duty, such as runway inspections, tests of R/T time on and off duty, etc. Completed Log Books will be retained for record purposes'.*

1.10.5 EIWT Movements Log

The movement log kept by ATC shows a total of 67 movements at EIWT on the day of the accident. The sheet indicates the departure of EI-CZL at 16.01 hrs on VFR Training detail. No arrival time or movement totals were noted. The only entry in the Remarks column was '*West*' indicating that the helicopter was *departing west* which is the default direction for all traffic, including training traffic departing Weston Airport unless otherwise coordinated.

1.11 Flight Recorders

Not fitted and not required to be fitted.

1.12 Wreckage and Impact Information

1.12.1 General

The impact occurred in an area of machined bog 2.5 km southeast of the village of Kilshanchoe. The bog was machined into level strips approximately 80 metres wide running in a north-westerly direction bounded on either side by raised banks (**Photo No. 1**).

Photo No. 1: General view of accident site facing direction of flight.

A layer of foliage with isolated trees covered the banks. Running parallel to the machined areas were drainage channels containing a depth of water. The Investigation was informed by a helicopter pilot, who was familiar with the area, that there was significant glare from the standing water in these channels when operating at low level. Power lines, supported on wooden poles, were positioned at wide intervals running across the machined strips at a right angle. The lines were used to provide power to turf-cutting machines and drainage pumps prior to being permanently de-powered in 2000.

The power line consisted of three, 7-strand aluminium cables, of 12 mm diameter. The cables were arranged side-by-side on a steel crossbar, with an inter-cable separation of 1.2 metres. The cross bars were supported by wooden poles placed at approximately 100 metre intervals. The poles were positioned on a bank rising to 2.2 metres above the general surface, with the height of the cables estimated to be in the approximately 30 ft (9 metres) above the surface of the bog floor. Due to the wide spacing between the poles, the cables exhibited significant droop. The external surface of the cables had oxidised over time from bright aluminium to a dull grey colour.

1.12.2 Wreckage Pattern

The main wreckage of the helicopter came to rest in an inverted position 16.5 metres beyond the position of the main rotor, and 53.5 metres from the transmission line on a heading of 320° M. The entire canopy was shattered into small pieces and spread around the main wreckage. The tailboom was severed at the attachment points, and swung clockwise to lie parallel to the body (**Photo No. 2**).

Photo No. 2: General view of main wreckage facing direction of approach

Commencing at a line between the two wooden poles that had supported the cables, the first piece of wreckage was a section of perspex from one of the doors including a round clear vision panel. This was found 5 metres forward of the line between the poles. Over the next 35 metres the ground was strewn with pieces of broken perspex and parts of the canopy frame. At a distance of 36.5 metres forward of the initial impact point, a transmission line cable was lying across the wreckage trail. The distribution of the debris field relative to the impact with the power lines is illustrated in **Appendix C**.

The main rotor head, attached to a portion of the helicopter's magnesium mast housing, had separated from the fuselage and was found with two power cables wrapped tightly around the head, on the right hand side of the wreckage trail at a distance of 42 metres from the initial impact point. A cable remained attached to each of the poles either side of the flight path. The main rotor drive shaft was complete and was also still attached to the head, with its upper end located inside the mast. The power lines and main rotor head are illustrated in **Photo No. 3**.

Photo No. 3: Detached Main Rotor, transmission pole is visible in the background

One complete rotor blade and the roots of the other blades were found attached to the rotor head. The second blade had fractured approximately 30 cm from the hinge, and the remainder of the blade was found in close proximity to the rotor head. The third blade had also fractured close to the blade root and this blade was located some 170 metres from the initial impact point. An impression where the fuselage had impacted the bog surface was located approximately 52 metres from the initial transmission line contact and the fuselage of the helicopter and its engine was lying inverted some 2 metres further on. There was no impact damage to the helicopter landing skids. Two cockpit instruments were located 66 metres forward of the initial impact point with the cables, and other than the main rotor blade, these were the furthest items of wreckage from the initial impact point.

On the accident flight the Student occupied the right seat and the Instructor occupied the left seat as is normal practice. The controls on the right seat were found undamaged. The Investigation found that the left-seat pilot controls were damaged in the accident sequence. The cyclic grip had detached from the cyclic stick and the left yaw pedal had fractured at the attachment points.

The helicopter contacted the transmission lines at the top of the rotor mast head, above the canopy and below the main rotor blades. One main rotor blade exhibited evidence of cable flailing damage to its trailing edge. The following blade in rotational sequence was the blade which had been severed and which was located 170 metres from the initial impact point. It exhibited severe cable strike impact marks on its upper surface out to a distance of approximately 1.5 metres from the blade root, in the area outboard of where it had been severed. There were similar marks on the lower surface of the portion of the blade root which had remained attached to the head. The third blade in rotational sequence exhibited no evidence of cable strike damage but there were cable-strike witness marks on the lower surface of the associated pitch bearing assembly. The cables around the mast head were both wrapped around the complete circumference of the head and had become enmeshed in each other. The magnesium mast casing fracture surfaces indicated that it had fractured through heavy tensile overload. The mast had an aft support strut. This strut failed at its attachment point to the fuselage in what appears to be a lateral bending overload.

The standard hourmeter was found intact on the instrument panel. Only the enclosure of the second (optional) hour-meter was recovered at the accident site, the actual instrument was not recovered at the time. This hour-meter was however subsequently found and made available to the Investigation.

1.13 Medical and Pathological Information

Post Mortem examinations were carried out on both occupants. Post Mortem Reports state that in each case death was due to multiple injuries following impact. Toxicology tests on blood and urine samples were carried out by the State Laboratory as part of the Post Mortem examinations. In the case of the Instructor all the results were negative, indicating that no ethanol or evidence of prescribed or proscribed drugs were detected in either blood or urine samples. In the case of the Student, all blood samples were negative with no ethanol or evidence of prescribed or proscribed drugs. In the urine sample, no ethanol or prescribed drugs were detected. However, a positive cannabis screen was identified. The test detected Delta-9-THC carboxylic[10] acid in the range of 300-500 ng/ml. Passive exposure to the substance may result in Delta-9-THC carboxylic acid levels detected in urine as high as 39 ng/ml[11].

1.14 Fire

There was no fire.

[10] **Delta-9-THC carboxylic acid**: One of the inactive cannabiniods present in Cannabis, and a major urinary metabolite of cannabis.
[11] **Ref**: Baselt R.C. 'Disposition of Toxic Drugs and Chemicals in Man' 7th Ed. 2004.

1.15 Survival Aspects

1.15.1 Search and Rescue

At 10.38 hrs, on 2 April 2009, following a telephone call from Weston ATS, Dublin ATC requested an Air Corps helicopter, which was airborne at the time, to conduct a general search of the area, west of the Dublin Control Zone. Dublin ATC also requested the Irish Coast Guard Dublin-based Sikorsky S.61 to search for the missing helicopter in the Weston – Enfield – Kilcock – Clane area. Following a review of the Radar recordings, the last known position of the helicopter was determined. The Irish Coast Guard helicopter was dispatched to this location and subsequently found the wreckage at 11.27 hrs.

1.15.2 Survivability

The deceleration loads, as the helicopter impacted the power lines, were considerable, following which the fuselage of the helicopter continued forwards to impact the ground surface in an inverted position. The pilot compartment was destroyed by the inverted impact. The seats and the harnesses on both pilots' seats remained intact.

1.15.3 Carriage of Emergency Locator Equipment

An Emergency Locator Transmitter (ELT) is a device carried on an aircraft or helicopter, which activates an emergency signal on a frequency of 406 MHz. This signal may be used to identify the aircraft by means of the ELT registration information and provides radio signal information to determine the location of the activated beacon. An 'Automatic' ELT is designed to activate on impact.

ICAO Annex 6, *Operation of Aircraft,* Part III (International Operations – Helicopters), '*shall be applicable to all helicopters engaged in international commercial air transport operations or in international general aviation operations, except that these Standards and Recommended Practices are not applicable to helicopters engaged in aerial work'.* Section 4.7.8 states that: '*From 1 July 2008, all helicopters in operating in performance Class 3 shall be equipped with at least one automatic ELT and, when operating on flights over water as described in 4.5.1 b), with at least one automatic ELT and one ELT(S)*[12] *in a raft or life jacket'.*

The requirement to carry an ELT on aircraft in the State were set out in S.I. 61 of 2006 (Operations) Order 2006 and Aeronautical Notice O.15 '*Emergency Locator Transmitters*'. Under Aeronautical Notice O.15, as operations undertaken by the FTO were not for Commercial Transportation, over water, or over undeveloped land areas '*where search and rescue could be especially difficult*', there was no requirement for such equipment to be carried on the accident flight.

1.16 Tests and Research

Not applicable.

[12] **ELT(S)**: Emergency Locator Transmitter (Survival)

1.17 Organizational and Management Information

1.17.1 Flight Training Organisation (FTO)

1.17.1.1 General

The authorisation to conduct flight training operations is given by the IAA. Such approval is based on the FTO conducting its operations in line with its IAA approved operational manuals. To conduct operations, appropriately qualified personnel are nominated as postholders. These postholders are divided into two broad categories, with responsibilities for JAR-FCL[13] and Company Management. The JAR-FCL positions are: Head of Training (HT) and Chief Flying Instructor (CFI). Two individuals were nominated to these positions that also share the functions of Chief Ground Instructor (CGI), and Deputy Chief Flying Instructor (DCFI). Company Management postholder positions consist of Accountable Manager, Quality Manager and Quality Auditor.

1.17.1.2 Head of Training

The HT has overall responsibility to the IAA for *'ensuring the satisfactory integration of flying training and theoretical knowledge instruction'*. The postholder is also responsible to the Managing Director for *'overall control of the approved syllabi in accordance with JAR-FCL 2 and CAP 682[14], liaison with the Chief Engineer, Chief Pilot and Company Directors on a regular basis, ensuring that the highest standards of flying are achieved and maintained by Company Pilots and Instructors, discipline of flying staff, regular reviews of the quality system and liaison with the authorities'*.

1.17.1.3 Chief Flying Instructor

The CFI has overall responsibility to the IAA for the *'supervision of Flight Training Instructors, the standardisation of Flight Training Instruction in accordance with* (Operations Manual) *Part D, and Flight Staff Standardisation Training'*. The postholder is also responsible to the Head of Training for the *'day to day running of flying training courses and programmes within the organisation, the scheduling of flying staff to meet training commitments, instructor continuation training, preparation for tests and examinations, liaison with the Chief Engineer, the control and maintenance of flying training documentation and records, supervision of FI (H) restricted, and deputise for the Head of Training'*.

1.17.1.4 Flying Instructors

Flying Instructors (FI) are responsible to the CFI for the *application of flight training in accordance with the Training Manual* (Operations Manual, Part D) *and Flying Order book* (Operations Manual, Part B). They are responsible for *'the development and flight education of those students detailed into their care, the completion of Instructors Flight Records after every flight…'*

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[13] **JAR-FCL**: Joint Airworthiness Requirements – Flight Crew Licensing.
[14] **CAP 682**: Civil Aviation Publication No. 682, Guidance for approval of Training Organizations.

Part B of the FTO Operations Manual details specific responsibilities of Commanders, inter alia, that the Commander shall '*be responsible for the safe operation of the helicopter and safety of its occupants and cargo during flight time*'.

1.17.2 Operations Manual

The FTO conducts training according to an IAA approved Operations Manual. According to the HT, the Instructor was briefed, amongst other matters, on minimum heights for operation during training exercises. Basic autorotation exercises are conducted between 2,000 ft and 1,000 ft and are generally carried out in Class G airspace, and not to ground level. Advanced autorotations to ground level are only conducted at EIWT.

1.17.3 Student Study Material

Study material made available to students by the FTO contained generic material on training to PPL standard with sections on *Theory of Flight, Meteorology*, *Human Factors, Navigation and Aviation Law*. The material contained in the notes was generic in nature and comprehensive. However, references to S.I. 20 of 1999 in the Aviation Law section (as sample questions and answers) were out of date, as this legislation has since been superseded by S.I. 72 of 2004.

1.17.4 Flight Authorisation Sheet

Each individual helicopter had a Flight Authorisation Sheet. There were four flight entries made on the sheet allocated to EI-CZL, two for 31 March 2009 and two for 1 April 2009, the accident date. All of these flights were made by the Instructor of the accident helicopter. The last entry was noted as departing EIWT at 15.05 hrs, arriving back at 15.35 hrs on 1 April 2009. The accident flight was not entered on the sheet.

1.17.5 Student Flight Training Course

The student was following a certified course of instruction, through an approved training syllabus, in order to obtain a helicopter licence. The FTO issues each student with a Flight Training Course File, which is used to record each element of the syllabus, completed and comments made by the instructor with regard to the performance and progress of the student following each flight.

A review of the student's file by the Investigation determined that the student was making steady progress with favourable comments being made by his instructors since first commencing training back in June 2008. On the flight prior to the accident flight, the student completed Exercise 1-11, '*Introduction to autorotations from altitude*' (basic autorotations), with a brief positive comment from the instructor identifying, *"Auto's better at the end. Good approach and landing"*. The next autorotation type exercise scheduled on the training syllabus was Exercise 1-12. This exercise is a review of procedures and flight manoeuvres previously covered with an '*introduction to forced landings and settling with power*' (advanced autorotations). Regarding this exercise, the manual states: '*the student shall be able to enter autorotation from a forced landing.*'

1.17.6 FTO Site Inspections

The FTO was subject of an on-site Inspection Report by the IAA on 24 July 2008 for FTO Approval following a change of ownership. This inspection revealed the FTO to be functioning to the same standards as under the previous management with some findings and observations of a minor nature. A further mid-term review was carried out by the IAA on 2 March 2009, about 1 month prior to the accident. This interim inspection raised a number of points regarding records, provision of technical ground school, the Quality system and updating of Operations and Training Manuals. The FTO did however meet the requirements of JAR-FCL. The report stated that a further inspection would be carried out prior to the FTO approval revalidation in July 2009.

1.18 Additional Information

1.18.1 Autorotation

In a helicopter, an autorotation is a descending manoeuvre where the engine is disengaged from the main rotor system and the rotor blades are driven solely by the upward flow of air through the rotor. In other words the engine is no longer supplying power to the main rotor.

The most common operational reason for performing an autorotation is in response to an engine failure. Therefore it is critical that students and pilots alike are trained, practiced and confident to conduct this manoeuvre in order that they are in a position to deal with such an eventuality. At the instant of engine failure, the main rotor blades are producing lift and thrust from their angle of attack and velocity. By immediately lowering the collective pitch, which must be done in case of an actual engine failure, the helicopter begins an immediate descent, thus producing an upward flow of air through the main rotor system. This upward flow of air through the rotor provides sufficient energy to maintain rotor speed (Nr), throughout the descent and in simplistic terms allows the helicopter glide to earth. When landing from an autorotation, the energy of the rotating blades is used to decrease the rate of descent and make a soft landing. Autorotation training is considered a challenging exercise for both the student and the instructor. Basic autorotation normally introduces the student to the immediate actions following an engine failure, entry into the autorotation, establishing a stable autorotative descent and powered recovery.

This exercise is normally conducted between 2,000 ft and 1,000 ft in open country. Advanced autorotations introduces the student, following the autorotative descent, to the final stages of the procedure, such as flare and touch-on/landing. This particular exercise is conducted over and into an approved autorotative area, normally an airfield, down to ground level. This is because airfields afford areas without obstacles and have Rescue and Fire-Fighting (RFF) facilities available. Advanced autorotations may also include manoeuvring during the descent, in order to turn or position for a more suitable landing site. When an engine fails in a single engine helicopter, the only option is to enter autorotation, select a suitable landing area and conduct a full power-off autorotative landing. A successful outcome to the engine failure is normally related to the type of terrain in which the helicopter is flying over at the time of failure and the level of practice/experience of the pilot flying.

In order to reduce the associated risks, autorotation training is carried out without shutting down the engine. This is achieved by lowering the collective lever 'to the floor' (zero collective) and reducing the throttle. These settings are maintained until a decision is made to either land/touchdown or carry out a power recovery. A power recovery is used to terminate practice autorotations at a point prior to actual touchdown. After the power recovery, a landing can be made or a go-around initiated. Apart from the safety element of the power recovery from practice autorotation, such a manoeuvre also allows a pilot to immediately transition away and climb back up to a height that is sufficient to commence another power-on autorotation.

1.18.2 Minimum Height Legislation

Both the CFI and HT stated to the Investigation that they had no doubt, subsequent to their initial flights with him, that the Instructor fully understood the rules of Irish Air Law and the Company's Operations Manual, and that he was also competent for passing such knowledge on to students.

Minimum Heights for operation in the State are set out in S.I. 72 of 2004 (Rules of the Air) Order. For operation of an aircraft (or helicopter), outside controlled airspace and away from congested areas, the minimum height for operation is 500 ft Above Ground Level (AGL). The following is extracted from S.I. 72 of 2004:

'3. Minimum heights

(1)Except as permitted by the appropriate authority or as hereinafter provided aircraft shall not be flown:

(a) over congested areas of cities, towns or settlements or over an assembly of persons, at less than: (i) a height of 450 metres (1,500 ft) above the ground or water, or (ii) a height of 300 metres (1,000 ft) above the highest obstacle within a radius of 600 metres from the aircraft, or (iii) such other height as would permit, in the event of the failure of a power unit, a safe forced landing to be made, whichever height is the greatest.

(b) elsewhere: (i) closer than 150 metres, (500 ft) to any person, vehicle, vessel or structure, or (ii) at a height less than 150 metres (500 ft) above the ground or water,

(c) over or in the immediate vicinity of any place within the State, where a large number of persons is assembled…'

As the minimum height for operation is 500 ft AGL, the helicopter was operating considerably below the legal minimum that is in force within the State.

In the USA, where the Instructor completed most of his flying before commencing work at the FTO, the legislation regarding minimum heights (for helicopters) is different in that, under Federal Aviation Regulations '*Helicopters may be operated at less than the minimums prescribed in paragraph (b) or (c) of this section if the operation is conducted without hazard to persons or property on the surface'*.

The US academy stated the following regarding autorotation practice carried out in the US: *'Normal flying practice in the local training areas here allow dual only autorotations to a flare and power recovery to a hover, the responsibility for the safe operation and look out resting with the instructor. We designate training areas where these should be carried out below 500 ft and any wires are well identified on local charts. All Academy local training areas are remote and away from built up areas and some do not allow flight below 500 ft AGL. Student solo autorotations, when authorized, specifically require recovery above 500 ft AGL. Simulated engine off landings with ground contact are only allowed at the airfield and by authorized instructors only'.*

1.18.3 Logging of Flight Hours

Two hour-meters were installed in EI-CZL. A standard hourmeter (on the main instrument panel) was actuated by main transmission oil pressure during engine start. This hour-meter was used to complete the Technical Log entries for each flight sector. The second (optional) hourmeter was activated by a squat-switch attached to the landing gear and recorded time when the helicopter was in flight. Regarding the second (optional) hourmeter, the Schweizer 269C-1 Pilot's Flight Manual notes: '*This installation records 'flight time, or 'time in service' as defined in FAR Part 1.1*[15] *and NO multiplying factor is required when this recorded time is used to determine periodic inspection requirements, overhaul intervals, and the service life of life limited components*'. Flight hours were also recorded by the Pilot using his watch and entered in the Technical Log. These timings were used to crosscheck the hourmeter readings.

1.18.4 Family Members Statements

The Investigation received a number of statements from members of the Instructors family and his girlfriend. These statements were carefully considered by the Investigation. On 20 March 2009, the Instructor was in Cork and due to fly EI-CZL back to EIWT, subsequent to a maintenance check having being carried out on the helicopter. Due to fog in the area, the Instructor refused to fly the helicopter and made this known to the FTO. The HT, who was more experienced and familiar with the route travelled from his home in Thurles to Cork where the helicopter was flown to Thurles to drop off the other Pilot, and on to EIWT. During this flight the Instructor commented that he had problems maintaining radio contact with Shannon and had to revert to Dublin Air Traffic Control.

On 31 March, the day prior to the accident, the Instructor took EI-CZL to Watergrasshill in Cork for minor maintenance work. This flight was made as an instructional flight with a student carrying out a navigational exercise to and from Watergrasshill. The Instructor later contacted his girlfriend saying he had made a precautionary landing due to foggy conditions en-route. According to the statement, comments were made by the Instructor regarding the engine sound of the helicopter. The statement also referred to negative comments made by the Instructor regarding the FTO.

[15] **Federal Aviation Regulations Part 1.1**: '*Time in service*' *with respect to maintenance time records, means the time from the moment an aircraft leaves the surface of the earth until it touches it at the next point of landing'.*

1.18.5 Actions Taken Subsequent to the Accident

1.18.5.1 Weston ATS

Following the accident, a number of NOTOC[16] were issued by the Senior Air Traffic Control Officer (SATCO)/Airport Manager. The full text of these NOTOC are reproduced in **Appendix D**.

NOTOC	Subject:	Issued:
No. 008/09	Accounting for Based Aircraft	2 April 2009
No. 009/09	Flight Planning and Alerting Service for VFR Training Aircraft	22 April 2009

NOTOC 008/09 states: *'At the close of the ATC watch, the Duty ATCO shall ensure that all based aircraft have been accounted for. Particular attention shall be given to training aircraft. If an ATCO is unsure as to whether an aircraft has not returned from a training detail, the ATCO should contact the aircraft operator to establish the whereabouts of the aircraft. If no information is available from the operator, assistance should be sought from Dublin ATCC[17]. If at this point, it emerges that the aircraft cannot be located and the ATCO is of the opinion that the aircraft is overdue, Dublin ATCC should be requested to initiate correct SAR[18] procedures.'*

NOTOC 009/09 details the requirements for filing of Flight Plans in abbreviated form for transit of the Weston AOR to and from Class G airspace.

'*When an aircraft calls for start-up, he must provide the following information: Aircraft Callsign/Registration, Details of Route or Type of Exercise, Estimated Elapsed Time (EET), Souls on Board, and Endurance'. 'Souls on board and endurance are supplementary information and can be obtained from the aircraft operator at short notice. If the aircraft does not offer the required information, the ATCO shall request this information from the aircraft in question. Particular attention shall be paid to the EET and this shall be recorded in the appropriate place on the Flight Progress Strip specific to the aircraft'.*

1.18.5.2 Airport Operator

Shortly after the accident, the Airport Operator put in place a requirement that all departing pilots enter the details of the intended flight in a daily log before being allowed access to the ramp area. This information is intended to complement the existing requirements of the individual FTOs and those of the local Air Traffic Service.

[16] **NOTOC**: Notice to Controllers.
[17] **Dublin ATCC**: Dublin Air Traffic Control Centre.
[18] **SAR**: Search and Rescue.

1.18.5.3 Irish Aviation Authority (IAA)

On 20 April 2009, the IAA sent a letter to the Chief Flying Instructors of all registered Flight Training Organisations (including Registered Training Facilities) in the State requesting that they review their Company procedures regarding overdue aircraft. Training facilities have indicated to the IAA what existing or revised procedures are in place. This review is ongoing by the IAA. For information, the document is reproduced in **Appendix E**.

1.18.5.4 The Operator (FTO)

In October 2009, the FTO amended its Operations Manual Part A, Section 2 (Operations Supervision and Control) to include a '*Flight Watch Programme*': '*The commander shall contact Operations support or the Registered owner after each scheduled landing which involves a shutdown to confirm Ops normal. If Operations support or the Registered owner do not receive a scheduled Ops normal call at ETA +20 minutes they shall attempt to contact the commander directly or ATC to establish the Aircrafts position. If after ETA +40 minutes and the aircraft position cannot be confirmed by contact with the commander or by ATC refer to Part A section 11'*. A copy of the document is reproduced in **Appendix F**.

1.18.6 Cable Strikes

1.18.6.1 General

The dangers of flying in a cable environment have been recognized for many years. For those helicopters engaged in approved commercial low-level type operations, such as power line inspections, forestry operations, fire fighting, etc, the threat is constant and detailed planning and situational awareness are required. Measures such as reconnaissance of the cable environment before ingress, the mounting of marker balls on cables and the installation of cable cutters on helicopters, do reduce the danger and the risk of a strike during such operations.

However, for the majority of helicopter operations the threat of a cable strike is generally only present during the take-off and landing phase. Once the helicopter climbs above the minimum safety height (500 ft) the threat should no longer exist. Where a helicopter descends back down in open country and below the safety height, it once again exposes itself to the risk of having a cable encounter.

Whether one sees a cable or not, is the product of a complex relationship between cable visibility and situational awareness. Visibility of suspended cables is notoriously variable. The same cable that clearly stands out against a bright homogeneous background (such as the daytime sky) may be virtually invisible when viewed against a darker and more heterogeneous background (such as a forest or bog land). In the dynamic realm of low-level flight, even small changes in vehicle (helicopter) position or vehicle attitude can precipitate such a background shift.

Thus, for any given cable strike, the cable may be virtually undetectable right up to the point of contact, or it may be shifting from visible to invisible rapidly and unpredictably. The human eye has physical limitations in its performance.

One such limitation is its power of resolution - that is, the minimal size of an object that can be registered - due to, the construction of the sensor (retina). In some respects the retina resembles the grain in black and white photographic film. The grain in the eye is determined by the finite size of the sense organs, the cones. The size of grain limits the detail that can be obtained. The periphery of the retina is coarse grained and picks up movement but not detail. The central part is fine grained and registers detail. Under specific conditions, i.e. against a plain contrasting background such as the sky, the eye has a compensating mechanism that relies on this contrast. In effect, we perceive the break in continuity of the background rather than 'seeing' the cable itself. The brain translates this into seeing. However, reduce the contrast and break up the plain background and we are back on to the basic visual mechanism limited by the grain (cone) size. The cable literally disappears as it is simply beyond the limits of the eye to see it.

These physiological facts have obvious and important implications for pilots. As such, pilots need to use a variety of skills/options to assess the presence of cables. This can be done prior to departure by viewing local maps, carrying out a local ground inspection, looking for poles or pylons were the likelihood is that cables would be attached. And prior to commencing descent for an approach/landing, carrying out an aerial inspection at an adequate safety height above the intended operating or landing site.

1.18.6.2 Recent Cable Strike Events

The AAIU is currently investigating a total of five cable strike events, which have occurred since the accident to EI-CZL. These events relate to a wide variety of general aviation types, including fixed wing, helicopter, glider, microlight and paramotor. These strikes as outlined below, occurred during different phases of flight:

Date:	Type:	Location:	Remarks:
1 April 2009	Schweizer 269	Co. Kildare	During transition
26 June 2009	Paramotor	Co. Louth	During overshoot
9 August 2009	Cessna 180	Co. Westmeath	During approach
27 December 2009	Mainair Blade	Co. Offaly	During approach
6 March 2010	Glider	Co. Offaly	During approach
1 May 2010	Robinson R22	Co. Kerry	During take-off

The IAA has made available information regarding Cable strikes available on its website in the form of Aeronautical Information Circulars (AIC). These include AIC 17/94 – Responsibility for Terrain Clearance and AIC 21/03 – En-route obstacles to Air Navigation.

1.19 Useful or Effective Investigation Techniques

Not applicable.

2. ANALYSIS

2.1 Introduction

The Student was undergoing a course of Instruction with an approved FTO to acquire a PPL(H). The accident flight departed that evening on a routine training flight, carrying out a standard exercise from the PPL(H) training syllabus. The helicopter departed from its home airfield at EIWT and routed to an area west of Dublin commonly used for training. Weather conditions were good.

The Instructor occupied the left seat and the Student occupied the right, as is normal practice on such a training flight. The flight was not entered on the booking out sheet by the Instructor as per normal procedure. The Student's training file indicated that he had completed a basic autorotation exercise (Exercise 1-11) on his previous two training flights, and that he was at a stage when further, more advanced autorotation exercises would have been appropriate. Radar and eye-witness information indicates that the helicopter was conducting manoeuvres with a high rate of descent as would have been applicable to the next scheduled exercise, 1-12: '*Forced landings* (autorotation) *and settling with power*'. The accident site was contained with an area of machined bog land consisting of large parallel formations, which resembled the general layout of a runway (**Photo No. 1**). The direction of travel of the helicopter was near into wind. The Investigation is therefore of the opinion that a practice autorotation exercise to low level was probably being carried out at the time of the accident.

2.2 The Accident Flight

At 15.52 hrs the Instructor requested clearance to start the engine from Weston ATS. This call was made without giving the full and required information regarding the planned flight to the ATCO on duty, specifically regarding the expected time of return. The ATCO did not query this omission by the Instructor. After lifting, the helicopter made a routine departure south of Maynooth to the west of Dublin CTR.

After initial contact with Dublin ATC at Maynooth, the Instructor described his intention to operate VFR south of Enfield between one and two thousand feet. Dublin ATC instructed the helicopter to remain clear of controlled airspace, which the Instructor of EI-CZL acknowledged at 16.11:59 hrs. This was the last communication from the helicopter as it proceeded to uncontrolled (Class G) airspace south of Enfield. The Operations Office of the FTO closed at approximately 16.30 hrs. Radar recordings show the helicopter manoeuvring in the area, and then making a steep descent. Below 1,000 ft the radar return was lost and some minutes later the helicopter re-appeared at 1,000 ft and climbed to 1,600 ft. Radar returns show the helicopter entered a second steep descent and did not re-appear. A number of witnesses recalled the helicopter operating in the area south of Enfield. Statements made to the Investigation support the evidence that the helicopter was engaged in autorotation training to low level. None of the witnesses saw the actual impact with the power lines. Witness No. 2 did hear the impact but was unsure of what she had actually heard.

2.3 Impact Analysis

The accident site was located in a flat open area of machined bog land, which comprised of parallel-machined tracts, bounded on both sides by banks and water channels. The tracts were orientated in a northwest/southeast direction. Unpowered electrical transmission lines crossed the tracts at right angles. The cables comprising the transmission lines were supported by wooden poles, located on the banks either side of the open area. The poles were partially embedded in foliage. The height of the cables at centre-span was approximately 30 ft (9 metres) above the bog surface.

Analysis of the wreckage confirmed that the helicopter impacted the power lines at considerable speed in an approximately level attitude and under engine power. Two of the power lines broke and became entangled in the rotor head with one main rotor blade becoming detached and travelling a considerable distance due to the rotor being under power.

The damage to the blades indicate that the initial cable strike contact was with an advancing blade, initially on its upper surface approximately 1.5 m from its root, which then cut through and severed the blade. This left witness marks on the lower surface of the blade root, which remained attached to the head. The severed portion of the blade was located some 170 metres forward of the impact point indicating that a high degree of rotational energy was present when the blade was severed. The next advancing blade remained attached in its entirety to the head but cable strike witness marks were present on the lower side of its pitch bearing assembly. The third blade displayed light flailing damage on its trailing edge near mid-span. It is probable that this was caused by a flailing cable as it unravelled after the initial impact.

The damage pattern indicates that a cable made contact with the top of the rotor disc severing a blade from top to bottom and then two cables made direct contact with the rotor head. The fact that the two cables were wrapped completely around the head indicates that the head was rotating rapidly at impact. As the cables were wound between once and twice around the head, this suggests that the blade rotation was stopped between one and two revolutions after impact. As the cables became taut, the fuselage of the helicopter pitched up rapidly, at which point the rotor head and drive shaft detached allowing the fuselage of the helicopter to continue forwards, impacting the ground in an inverted position. The landing skids were completely undamaged by the impact confirming the wreckage impacted in an inverted attitude and did not tumble. It is likely that, as the helicopter pitched severely upwards following the cable strike, the loading of the two cables wrapped around the head caused the mast to fracture in overload near the aft cabin lateral bulkhead. The mast structure fractured through heavy tensile load. The aft support strut of the mast failed at its attachment point to the fuselage due to a lateral bending overload. The direction of bending at the fracture is consistant with right yaw of the fuselage as a result of rotor stoppage. The main rotor drive shaft housed inside the mast was pulled completely clear of the main gearbox.

The location of the fuselage/cabin structure complete with engine some 54 metres from the initial impact point suggests significant forward velocity at the moment of impact with the cables.

2.4 Wreckage Examination

Examination of the wreckage revealed no defects with the helicopter or its powerplant that may have caused, or contributed to the accident. The impact damage to the left-seat flight controls (cyclic control and yaw pedal) was consistent with the occupant of that seat holding the controls at the time of impact. No such damage was found on the right seat controls.

2.5 The Accident

The Investigation is satisfied that the helicopter was engaged in an instructional exercise involving a power-on autorotation to low level. Two steep descents were performed in a westerly direction, which indicates that the helicopter was manoeuvring intentionally. Additionally, the transponder code was set to the general VFR code. If a pilot has an emergency of any nature, it is normal practice to make a MAYDAY (distress) call to Air Traffic Services and change the transponder to the emergency code. As no emergency call from EI-CZL was heard on either Dublin or Weston active frequencies, and no change was made to the transponder code, the Investigation is of the opinion that an emergency situation did not exist during the final descent.

The Investigation found no evidence of the helicopter making ground contact prior to the impact. This indicates that the helicopter did not land during the autorotation exercise. It is possible that the helicopter came to a hover following an autorotative flare and then transitioned away or that it abandoned the final stages of the autorotation at very low level and transitioned away without establishing the hover. Either way, what is clear is that the helicopter subsequently struck the cables at a height of approximately 30 ft (9 metres), in a level attitude, with significant forward velocity. The transition away requires the application of power, while at the same time pitching the nose down, in order to accelerate, level above the surface, towards an entry into climb speed of approximately 60 kts. The Investigation is therefore of the opinion that the helicopter was most likely performing a transition away when it impacted the cables.

The environment in which the helicopter was flying was such that it would have been very difficult for either pilot to identify the presence of power lines at such low level, without having carried out a previous reconnaissance of the area. The wooden poles supporting the power cables were unique to the bog infrastructure and were spaced approximately 100 metres apart in order to facilitate the movement of large bog land machinery. The combination of this wide pole spacing and the fact that the poles themselves were partially obscured by foliage would have made it very difficult for the pilots to see the poles in their normal field of vision as they transitioned forward. As a helicopter pitches nose down during the level transition, the line of pilots' vision is somewhat limited towards the upper regions of the horizon. In addition, the low sun, the reflective glare from water in the adjacent drainage channels and the general dull brown/grey colour of the bog surface would have impeded the pilots' ability to clearly identify the presence of power lines ahead. It is probable that neither the Instructor nor the Student were aware of the existence of the power lines, up to the moment of impact.

2.6 Flight Plans

The filing of a flight plan is mandatory for operation within controlled airspace including the Weston AOR. By agreement with Dublin ATC, pilots are required to pass by telephone or more usually by R/T, the details of the intended route, type of exercise to be carried out, the expected elapsed time to be airborne, the number of persons on board, and the endurance of the aircraft.

The only details passed by R/T to the ATCO by the Instructor were '*request engine rotor start for departure to the west*' and '*ready to lift, departure to the west'*. The flight details as passed were accepted by the ATCO as a departure west, not returning. This was the third flight of EI-CZL that day and a degree of familiarity was evident with radio transmissions. Although this had no bearing on the actual accident, it meant that the helicopter was not posted missing and delayed established procedures for lost aircraft being activated.

Regarding the monitoring of aircraft by the ATS at Weston, the Investigation is of the opinion that this has been adequately addressed by NOTOC 008/09 '*Accounting for Based Aircraft*' and NOTOC 009/09 '*Flight Planning and Alerting Service for VFR Training Aircraft*'. As a result of these notices being issued, the Investigation makes no Safety Recommendation regarding ATC procedures.

2.7 Pilot Licensing

The Instructor held a UK JAR Commercial Pilot Licence (Rotorcraft) and appropriate Instructor Rating and was properly licensed for the flight. Although the Student held an SPL(H), he was restricted to dual instruction as his Class I Medical was no longer current. Without a current medical, the Student would be unable to undertake solo flight. As the Student only undertook dual instruction after the expiry of his medical, the lapse of his medical certificate is of no significance to the accident.

2.8 Maintenance

The helicopter was properly registered in the State and had a valid Certificate of Airworthiness at the time of the accident. The aircraft was maintained in accordance with an Approved Maintenance Schedule.

During the technical inspection carried out at the AAIU facility at Gormanston, no defects other than those caused by cable impact or ground impact were found. The Investigation is of the opinion that the serviceability of the helicopter was not a factor in the accident.

2.9 Medical and Pathological Information

According to the Post Mortem Report, the positive toxicology test identified in the Student states that the individual used a proscribed substance in the recent past, which could be hours, days or weeks depending on the use pattern. It does not indicate that the individual was under the influence of the substance at the time the sample was obtained.

Urinary concentrations of THC (the primary psychoactive ingredient in Cannabis) are very difficult to interpret due to variables such as dosage of THC ingested, frequency of prior use, timing of urine sample testing relative to last exposure to the substance, rate of release of stored cannabinoids in adipose tissue, concentration of urine and body weight. Therefore, the detection of THC metabolites in urine is only an indication of past cannabis use and is not related to the degree of intoxication or impairment. Positive urine specimens for THC merely indicate that the substance was ingested at some time in the past.

When the pilots reported for their flight, the FTO operations officer noted nothing unusual and that the pilots were looking forward to the flight. It is also considered likely that if the Student was in someway impaired, that this would have been identified by the Instructor and the flight would not have been undertaken. The operation of the helicopter, as evidenced by radar recordings and eyewitness accounts, indicates that it was under normal control and performing a series of deliberate, intentional manoeuvres. There is no evidence that improper use was made of the controls or that the flight was erratic in any way. The Investigation is therefore of the opinion that this single positive test result did not have a bearing on the accident.

2.10 Events Following the Accident

The accident occurred at approximately 16.34 hrs. None of the witnesses saw the helicopter impact the power lines. Although the helicopter was providing a return on Dublin ATC radar it was not under their control as it was operating outside controlled airspace.

The first indication that the helicopter could be missing was the failure to return to EIWT before closure of the ATC watch. As no elapsed time for the flight was known the helicopter was not expected back at a specific time. On closure of the watch, the ATCO saw that EI-CZL had not returned to EIWT and made the assumption that the helicopter had landed away from base as it had the day before. Consequently, no alert was raised at this time. As the FTO Operations had closed during the training flight, staff were therefore not aware that the helicopter had failed to return. Although the Student had booked a training slot, there was no written record at the FTO of the flight having departed, as no entry was made in the booking out sheet. This omission made the status of the helicopter unclear the following day when family members made enquiries.

2.11 Family Statements Received by the Investigation

In statements received by the Investigation, comments were made by the Instructor regarding the serviceability of EI-CZL, the accident helicopter. It is apparent that the Instructor experienced communication difficulties during the flight to EIWT from Cork on 20 March 2009. The difficulty experienced is likely to be attributed to the relatively low cruising level of EI-CZL on the flight, as '*line of sight*' with the station is necessary with VHF transmissions, and is experienced with all aircraft operating at such levels. The Investigation noted that no defects were recorded by any pilot in the Technical Log of EI-CZL over a period of four months prior to the accident. The Technical Log would be the appropriate place for any defects, or suspected defects, to be recorded.

2.12 Pilot-in-Command

A Flight Instructor, as Pilot-in-Command, is responsible for the operation and safety of an aircraft or helicopter during flight irrespective of whether the flight is made solo, with passengers, or for purposes of instruction with a student pilot. If a student is operating the controls, and deviates from safe controlled flight in any way, the Pilot-in-Command remains wholly responsible for the operation and safety of the aircraft or helicopter. Additionally, if a Pilot-in-Command considers an aircraft (or helicopter) not to be airworthy due to a defect or defects, then such defects must be brought to the notice of suitably qualified Engineering personnel by entering such defects in the Technical Log.

While operating over an uncongested area, a descent below 500 ft AGL was in contravention of S.I. 72 of 2004 (Rules of the Air) Order. As the Instructor did most of his flight training in the USA, he would have been more familiar with the FAR requirements, which differ from those of the State. In any case, the only legislation applicable was that of the State, irrespective of any other considerations. According to the HT, the Instructor was fully briefed regarding minimum heights to be observed during training exercises.

2.13 Pilot Handling

The Investigation is satisfied that the particular flight was an instructional detail, whereby the right-hand seat occupant, the Student, was being instructed by the left-hand seat occupant, the Instructor. Ultimately, a qualified instructor is the Pilot-in-Command and thus is responsible for the overall safe conduct of the flight. In addition, where an in-flight emergency occurs or where the right-hand seat occupant endangers the safe conduct of the flight or is unable to maintain safe controlled flight, it is the responsibility of the qualified instructor to take-over control. This is done irrespective of the ability or experience of the right-hand seat occupant. All instructors are aware of these responsibilities following successful completion of a recognised instructor course and instructor skill test.

In general, there are three possibilities regarding who was flying the helicopter throughout the detail and leading up to the point where contact was made with the cables. The first is where the instructor has full control of the helicopter in order to demonstrate the exercise to the student. The student observes the actions of the instructor but does not take part in flying the helicopter. The second is where the exercise is flown again by the instructor, but with the student following through on the controls. This gives the student a hands-on feel during the exercise. Where the student inputs poor technique or error, it is the responsibility of the instructor to resolve the issue through verbal guidance or intervention. The third is where the instructor allows the student to fly the exercise himself. Intervention from the instructor would normally only take place where the student endangered the safety of the helicopter.

A variety of these scenarios would normally be used throughout an instructional exercise. With regard to the accident flight, the impact occurred early on in the exercise.

The helicopter had made one descent, prior to the accident descent and it is considered likely that the Instructor was demonstrating the advanced autorotation technique during the initial descent.

While impact evidence suggests that the Instructor was at the controls at the time of impact, this is not definitive proof that he was controlling the helicopter just prior to impact. The Instructor may have been flying the transition away or, it may be that the Student performed the transition away but the Instructor took control just prior to or during the impact. As such, the Investigation cannot definitively identify who was controlling the helicopter on the second and final descent and during the transition away towards the cables.

2.14 Flight Training Organisation (FTO)

The Investigation is of the opinion that the closure of the FTO Operations Office, while a helicopter was still out on a training detail, was one of the factors, which led to the alert not being raised until the following day. The IAA sent a letter to all registered flight training facilities regarding their procedures when an aircraft is overdue and that these procedures be reviewed. As the IAA is currently reviewing this situation, the Investigation is satisfied that no Safety Recommendation is appropriate at this time. The Investigation is of the opinion that the 'flight watch' scheme such as has been implemented by the FTO in August 2009 is a minimum standard to be achieved and, along with other approved training organisations, such schemes are currently under review by the IAA.

The exercise, which was being carried out on the accident flight, was in all likelihood, an advanced autorotation to a low level. Under normal circumstances this exercise is carried out at the base airfield, as it requires a descent below the minimum safety height of 500 ft and to perform a landing from the autorotation. As to why the Instructor decided to conduct this exercise in the training area cannot be determined by the Investigation.

Witness reports indicate that low-level operations were routinely carried out by helicopters in the area of the accident for a considerable period prior to the accident. The Investigation accepts that these helicopters may or may not have belonged to the FTO. However, the combination of the lack of flight following of the training aircraft and the fact that the Instructor was performing an exercise that should have been carried out at the base airfield, indicates to the Investigation that the level of oversight by the FTO on its Instructors was unsatisfactory.

2.15 Emergency Location Equipment

Regarding the accident helicopter, the carriage of an automatically activated ELT was not required under ICAO Annex 6 or Irish regulations, as the flight was not engaged in international operations. However, the IAA has indicated to the Investigation that it will reassess the requirements for the carriage of ELT equipment in general aviation aircraft.

In this particular accident, the carriage of a Personal Location Beacon (PLB) would not have made any material difference as such devices must be activated by the user, which was not possible. However, as identified in a letter from the IAA, the use of a Personal Location Beacon (PLB) may provide a user with a means of alerting Emergency Services in the event of an accident, which may be especially useful in remote areas where mobile phone coverage is poor. However where the user is incapacitated for any reason, this may not always be possible.

At the Sixteenth Meeting of the ICAO[19]/IMO[20] Joint Working Group (JWG), the regulation of carriage of Personal Locator Beacons was discussed under a working paper (ICAO/IMO JWG-SAR/16-WP.11 10 August 2009). Amongst action to be taken is the discussion of the potential carriage of PLBs by aircraft as an acceptable means of compliance with crash alert and location signalling equipment regulations, including their substitute for automatic ELTs, particularly in the general aviation environment. Considering the comments above, no Safety Recommendations are made with regard to the carriage of ELT or PLB equipment. However, a copy of the Final Report shall be sent to the ICAO/IMO JWG.

2.16 Cable Strike Events

The AAIU are investigating a total of six cable strike events which have occurred within general aviation over the past year. By comparison, since 1997 when the last fatal cable strike occurred, there have been only two significant cable strikes before this accident to EI-CZL. The high number of cable strikes over the past months is a concern to the AAIU. Although the IAA has published information (as Aeronautical Information Circulars) which allude to the potential dangers posed by overhead cables, it is felt they do not fully address the hazardous potential of a cable strike. As such it is considered appropriate that an awareness campaign be developed to inform general aviation pilots on the potential hazards of cable strikes. A Safety Recommendation to that effect is made to the IAA.

[19] **ICAO**: International Civil Aviation Organisation.
[20] **IMO**: International Maritime Organisation.

3. CONCLUSIONS

(a) Findings

1. The Instructor was properly licensed.

2. Weather was not a factor in the accident.

3. Required information regarding the planned flight was not passed to Weston ATS by the Instructor on engine start-up.

4. The ATCO at Weston accepted the flight details as passed by the Instructor as a departure west, not returning.

5. The Instructor informed Dublin ATC that he intended to operate '*between 1,000 ft and 2,000 ft to the south of Enfield'*, outside of controlled airspace, in the area where the accident occurred.

6. It is probable that Exercise 1-12 was being conducted at the time of the accident. This exercise involved descending in autorotation to a low level, followed by a transition at low level before climbing away.

7. The instructional exercise probably being carried out by the instructor at the time of the accident should have been conducted at the base airfield.

8. The helicopter descended below 500 ft AGL. This descent was in contravention of S.I. 72 of 2004 (Rules of the Air) Order.

9. The helicopter impacted disused transmission lines at considerable forward speed while flying at a height of approximately 30 ft AGL, probably while carrying out a transition away from a practice autorotation.

10. The topography, local environmental conditions and the power line layout was such that it would have been very difficult for the pilots to see the cables during the descent and subsequent transition away.

11. During impact the main rotor assembly detached from the body of the helicopter, which continued forwards and impacted the ground in an inverted position.

12. The accident was unsurvivable. The occupants were fatally injured as a result of impact.

13. At the closure of watch, the ATCO noted that EI-CZL had not returned but considered that the helicopter had landed elsewhere as it had the previous day.

14. The Operations Office of the FTO was not occupied at the time the flight was due to return.

15. The alert for the missing helicopter was only raised when family members became concerned.

16. In the case of the accident to EI-CZL, ELT equipment may have alerted the Emergency Services to the accident and the location of the helicopter.

17. The level of oversight by the FTO on its training instructors was unsatisfactory.

(b) Probable Cause

Impact with disused power lines at a height of approximately 30 ft AGL while transitioning away from a low level practice autorotation exercise.

(c) Contributory Factors

1. The decision by the Instructor to carry out Exercise 1-12 '*Forced landings and settling with power'* away from the area designated for such exercises, where significant obstacles existed.

2. The Instructor allowed the helicopter to descend below the minimum height as specified in S.I. 72 of 2004 (Rules of the Air).

3. Visibility may have been impaired as a result of low sun elevation and reflective glare from surface water in the area.

4. SAFETY RECOMMENDATIONS

This Investigation makes the following Safety Recommendation:

That the IAA undertake to develop a suitable awareness campaign to inform general aviation pilots on the potential hazards of cable strikes. **(IRLD2010015)**

Response:

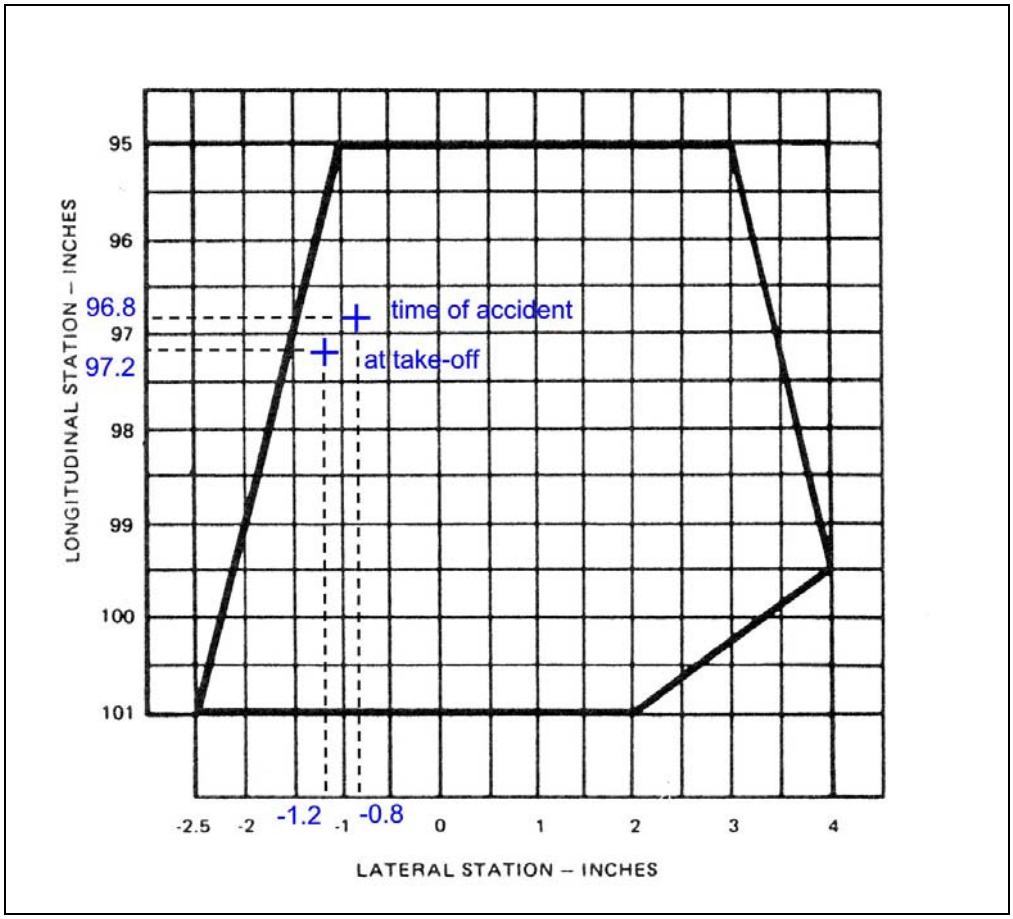
'The Authority accept this Safety Recommendation. As part of the IAA General Aviation Safety Awareness training programme a Safety Poster on wire strikes is due to be published in the Flying in Ireland magazine and placed on the IAA website. Additionally, specific wires strike awareness training material will be produced and distributed as part of the State safety Programme.'

Appendix A

Estimated weight and balance of EI-CZL at take-off and at the time of the accident

	weight (lbs)	**arm** (inches)	**moment** (lb/inches)
Basic empty weight:	1,166	100.0	116600
Pilot 1 (LHS):	187	83.2	15558
Pilot 2 (RHS):	193	83.2	16058
Fuel:	174	108.5	18879
At take-off:	= 1,720	97.2	167095
Estimated fuel used:	- 47	108.5	- 5099
At time of accident:	= 1,673	96.8	161996

Centre of Gravity envelope



Schweizer 269C-1 Pilot's Flight Manual

Appendix B

Transcript of exchanges between EI-CZL and Weston Tower on 122.400 MHz between 15.52 and 16.11 on 1 April 2009

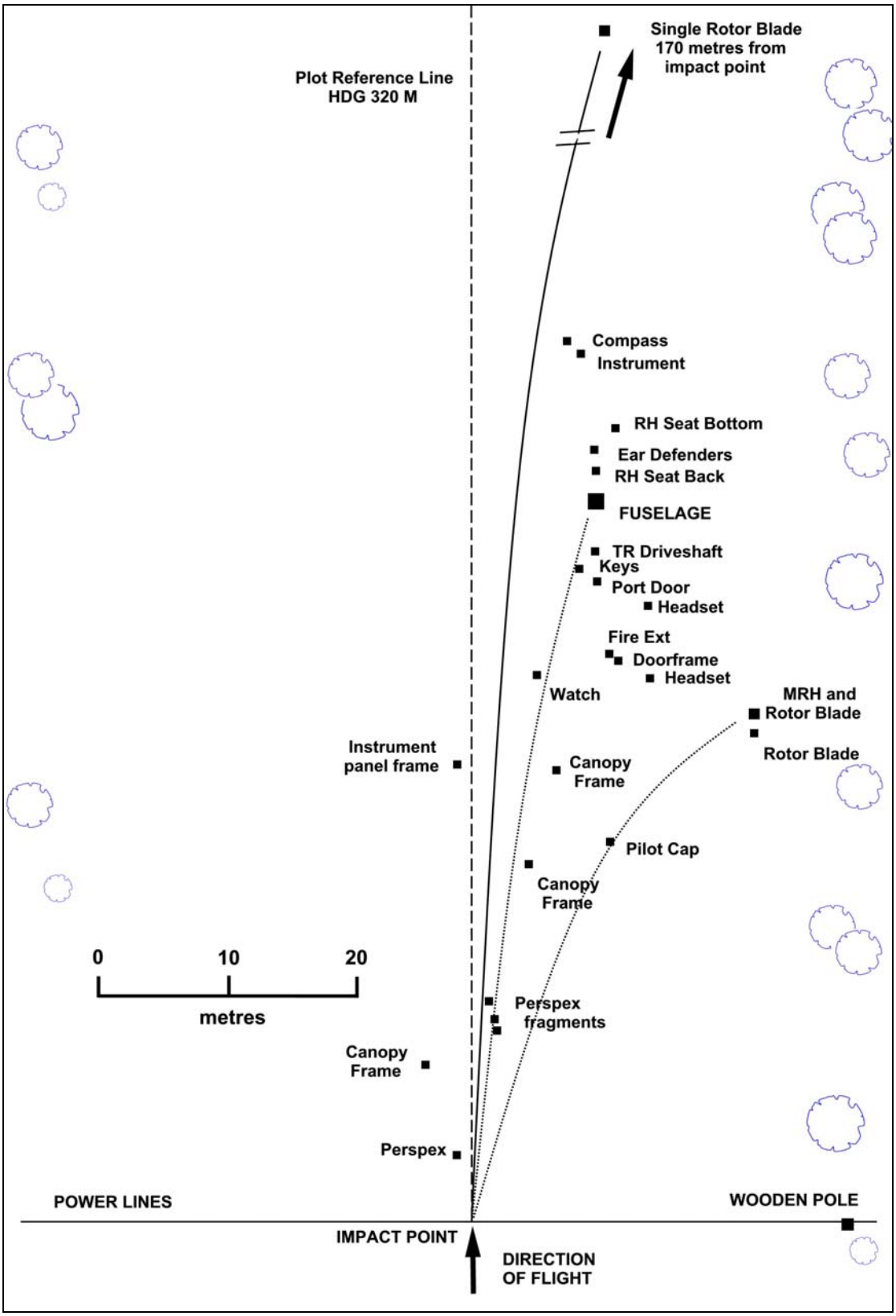
Time:	From:	To:	Transmission:
15.52:39	EI-CZL	Weston	*Weston tower, Echo India Charlie Zulu Lima request when able*
	Weston	EI-CZL	*Charlie Zulu Lima, pass your message*
	EI-CZL	Weston	*Charlie Zulu Lima, request engine rotor start for departure to the west*
	Weston	EI-CZL	*Charlie Zulu Lima start approved*
	EI-CZL	Weston	*Start approved Charlie Zulu Lima*
16.02:37	EI-CZL	Weston	*Charlie Zulu Lima ready to lift, departure to the west*
	Weston	EI-CZL	*Charlie Zulu Lima, lift approved, towards the VOR for right turn west, surface wind 190 at 7 kts*
	EI-CZL	Weston	*Lift approved, right turn out at the VOR…Charlie Zulu Lima*
16.09:13	Weston	EI-CZL	*Charlie Zulu Lima, no transponder information from you, one two nine one seven…*[clipped by next transmission]
	EI-CZL	Weston	[clipped] *…in the zone, could you tell us if R16 is active?*
	Weston	(EI-CZL)	*Sorry crossed transmission who's that?*
	EI-CZL	Weston	*Charlie Zulu Lima approaching Kilkock and leaving the Zone and can you confirm if R16 is active?*
	Weston	EI-CZL	*Charlie Zulu Lima, negative military activity right now*
			[no response]
16.10:51	Weston	EI-CZL	*Charlie Zulu Lima Weston*
	EI-CZL	Weston	*Charlie Zulu Lima?*
	Weston	EI-CZL	*Roger, did you copy that, no military activity right now*
	EI-CZL	Weston	*Copy that Charlie Zulu Lima, and we are leaving the Zone at Kilcock*
	Weston	EI-CZL	*Roger that, no transponder information from your aircraft and one two nine one seven is the frequency for information, bye now*
	EI-CZL	Weston	*One two nine one seven and sorry about the transponder Charlie Zulu Lima*

Transcript of exchanges between EI-CZL and Dublin ATC on 129.175 MHz between 16.11 and 16.12 on 1 April 2009

Time:	From:	To:	Transmission:
16.11:29	EI-CZL	Dublin	*Dublin Echo India Charlie Zulu Lima*
	Dublin	EI-CZL	*Go ahead*
	EI-CZL	Dublin	*Charlie Zulu Lima 2 miles west of Kilcock, climbing for 2,000 ft, we're just going to operate VFR just south of Enfield, between one and two thousand feet*
	Dublin	EI-CZL	*Roger, remain clear of controlled airspace, Dublin using runway one zero*
	EI-CZL	Dublin	*Say again for Charlie Zulu Lima*
	Dublin	EI-CZL	*I will say again, remain clear of controlled airspace, Dublin using runway one zero*
16.11:59	EI-CZL	Dublin	*Remain clear of the airspace, Charlie Zulu Lima thanks*

Appendix C

Wreckage distribution and debris field of EI-CZL



Appendix D

Notice to Controllers

NOTOC 008/09

02 April 2009

Accounting for Based Aircraft

At the close of the ATC watch, the Duty ATCO shall ensure that all based aircraft have been accounted for.

Particular attention shall be given to training aircraft. If an ATCO is unsure as to whether an aircraft has not returned from a training detail, the ATCO should contact the aircraft operator to establish the whereabouts of the aircraft. If no information is available from the operator, assistance should be sought from Dublin ATCC.

If at this point, it emerges that the aircraft cannot be located and the ATCO is of the opinion that the aircraft is overdue, Dublin ATCC should be requested to initiate correct SAR procedures.

This NOTOC takes immediate effect.

[*deleted-AAIU*]
SATCO/Airport Manager
Weston Airport

Notice to Controllers

NOTOC 009/09

22 April 2009

Flight Planning and Alerting Service for VFR Training Aircraft

Aircraft operated by based FTOs and RTFs at Weston Executive Airport (WEA) may file an abbreviated flight plan for transit of the Weston AOR to and from Class G airspace.

This abbreviated flight plan will be held locally at ATS Weston.

Contents of Abbreviated Flight Plan

When an aircraft calls for start-up, he must provide the following information:

Aircraft Callsign/Registration

- Details of Route or Type of Exercise
- Estimated Elapsed Time (EET)
- Souls on Board
- Endurance

Souls on board and endurance are supplementary information and can be obtained from the aircraft operator at short notice.

If the aircraft does not offer the required information, the ATCO shall request this information from the aircraft in question.

Particular attention shall be paid to the EET and this shall be recorded in the appropriate place on the Flight Progress Strip specific to the aircraft.

Parameters of the Abbreviated Flight Plan

The abbreviated flight plan is solely to allow based training aircraft to transit Class C airspace to and from Class G airspace.

Weston ATS is not empowered to provide any air traffic services in Class G airspace.

On exiting Class C airspace, aircraft may be instructed to contact the appropriate Dublin ATS frequency, should they require a frequency to avail of a Flight Information Service.

VFR Flights on AIS Filed Flight Plan

VFR flights which have filed a flight plan with AIS shall be coordinated with Dublin ATS. These flights shall be provided with a transponder code and an onward frequency.

These flights will be in receipt of a Flight Information and Alerting Service from Dublin ATS.

Alerting Service

Weston ATS shall maintain responsibility for the provision of an alerting service to aircraft operated by based FTOs and RTFs at WEA, which have filed an abbreviated flight plan indicating their intention to return to WEA.

Using the information provided in the abbreviated flight plan, Weston ATS shall monitor an aircrafts adherence to the details provided, with particular emphasis on the estimated elapsed time.

When an ATCO becomes aware that an aircraft is overdue, the appropriate procedures for alerting service shall be initiated see NOTOC 010 of 2009.

Summary

(1) When a based training aircraft calls for start up and provides details of registration, route and estimated elapsed time, this constitutes an abbreviated flight plan.

(2) This abbreviated flight plan entitles an aircraft to all the ATS services appropriate to Class C airspace.

(3) If an ATCO is unsure about any details of a flight, you should question the flight crew until you are satisfied that you have all relevant information.

(4) You must have the EET of the aircraft as this will be the foundation for all actions subsequently carried out during the various phases of the alerting service.

This NOTOC takes immediate effect.

[*deleted-AAIU*]
SATCO/Airport Manager
Weston Airport

Appendix E

Letter from the Irish Aviation Authority to all FTO

IRISH AVIATION AUTHORITY
ÚDARÁS EITLÍOCHTA NA hÉIREANN

AVIATION HOUSE, HAWKINS STREET, DUBLIN 2, IRELAND
TEL: (01) 671 8655 FAX: (01) 679 2934
WEB SITE: www.iaa.ie

20 April 2009

Chief Flight Instructors
All IAA Registered Flight Training Organisations

The tragic circumstances surrounding two recent accidents remind us of the importance of having a procedure in place to notify search and rescue in the event that a flight is overdue. This is particularly important for training flights which may involve low time and relatively inexperienced student pilots.

Please review your company procedures to ensure that :

- Procedures exist in the company emergency plan for overdue aircraft.
- The school should ensure an overdue action plan which is independent of ATC, particularly when operations are outside controlled airspace.
- A nominated person is contactable by the emergency services whenever flight operations are in progress.
- Procedures exist at the Flight School to record flight details including endurance, souls on board and contact phone numbers prior to flight.
- Flight Instructors and Students are fully appraised of the correct terminology to trigger SAR services.
- Flight Instructors and Students are fully conversant with ATC procedures and services and are aware of the service they are actually receiving in flight. (The phrase 'for information only' does not constitute a flight plan).

In recent times new types of Personal Locator Beacons (PLBs) which work with the Compas SARSAT system on 406 MHz have become widely available. There may be circumstances where aircraft (particularly those routinely operating in remote areas), would benefit from systems such as these and all possibilities should be considered.

Yours Sincerely,

[Text Deleted]

Irish Aviation Authority

Appendix F

Amendment to FTO Operations Manual Part A regarding Flight Watch Programme

	PART A SECTION 2 ~~OPERATIONS SUPERVISION AND~~ CONTROL				
AUTHOR:	APPROVED BY:	PUBLISHED BY:	ISSUE 1	REVISION 0	DATE Oct 09

Flight Watch Programme

i) All flights on Micad aircraft must have prior approval of the Registered Owner

ii) All aerial works flights/Training flights leaving Weston circuit must file an ATC flight plan at least one hour prior to departure. The aircraft commander will ensure the Registered Owner has full details of the intended flight which must include ETD, EET and ETA.

iii) Operations support which is based at Weston Airport will dispatch all aerial works/Training flights. It is the commander's responsibility to ensure that the relevant sections of the Flight Authorisation Sheet are completed prior to departure. See Appendix 1.

iv) If the Commander makes an unscheduled landing, he will inform Operations support and the Registered Owner by telephone outlining the details of the landing and his revised ETA.

v) The commander shall contact Operations support or the Registered owner after each scheduled landing which involves a shutdown to confirm Ops normal. If Operations Support or the Registered Owner do not receive a scheduled Ops normal call at ETA + 20 minutes they shall attempt to contact the commander directly or ATC to establish the Aircrafts position. If after ETA + 40 minutes and the aircraft position cannot be confirmed by contact with the commander or by ATC refer to Part A section 11

vi) The commander will notify Operations support and the Registered Owner once the aircraft has completed the day's mission successfully. If the flight terminates at a location other than Weston. The commander will notify the Registered Owner by telephone.

vii) The Commander must ensure that he closes his ATC flight plan on landing. If he is unable to make contact by RT, he will do so by telephone.

viii) On returning to Weston Airport the remaining sections of the flight authorisation sheet must be completed.

ix) Contact Details

Footnote: **Micad aircraft**: Aircraft used for Aerial Work purposes.

- END -