Accident

Aircraft Type and Registration:	Piper PA-28-180, G-AYUH	
No & Type of Engines:	1 Lycoming O-360-A4A piston engine	
Year of Manufacture:	1970 (Serial no: 28-7105042)	
Date & Time (UTC):	21 August 2023 at 0820 hrs	
Location:	Near Stanley Hall, Halstead Hall, Essex	
Type of Flight:	Private	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - 1 (Fatal)	Passengers - N/A
Nature of Damage:	Aircraft destroyed	
Commander's Licence:	Private Pilot's Licence	
Commander's Age:	72 years	
Commander's Flying Experience:	407 hours Last 90 days - 7 hours Last 28 days - 1 hour	
Information Source:	AAIB Field Investigation	

Synopsis

Whilst approaching Earls Colne Airfield, the pilot of G-AYUH encountered weather that was not compatible with flight under VFR. The airfield was in fog, but this was not relayed to the pilot when he requested airfield details. Following an attempted track reversal manoeuvre and climb, the aircraft departed from controlled flight and struck trees and terrain, fatally injuring the pilot.

Safety action has been taken by the Civil Aviation Authority (CAA) and the operator of Earls Colne Airfield. The CAA Published a Safety Notice and a Supplementary Amendment to CAP 452 to highlight those occasions when radio operators should provide pilots with additional information for the purpose of alerting them to hazards and avoiding immediate danger. The airfield operator introduced additional processes to provide guidance to radio operators on reporting of weather conditions at the airfield to pilots.

History of the flight

G-AYUH was based at Old Buckenham Airfield in Norfolk and was owned by a syndicate. The pilot, who was a member of the syndicate, was due to fly to Earls Colne Airfield in Essex to complete training that had been directed by the CAA. On the evening before the day of the accident flight, the pilot telephoned Earls Colne to request a PPR[1]. A radio operator at

Footnote

[1] Prior Permission Required (PPR): is a requirement at many airfields where visiting pilots give notice of their intention to arrive and land on a specific day and time. This is commonly achieved by a telephone call, email or notification on the airfield's website.

Earls Colne acknowledged the PPR and suggested that the pilot call again before departure the following morning to confirm the airfield conditions. He informed the pilot that the airfield opened for flights at 0800 hrs (0900 hrs local) and that he would be available to receive a call from 0700 hrs (0800 hrs local). However, no telephone call was received from the pilot on the morning of the accident.

G-AYUH departed Old Buckenham at 0753 hrs on 21 August 2023, with the pilot as the sole occupant. CCTV at Old Buckenham captured the aircraft's departure and showed clear skies with good visibility. The pilot had previously flown the route on 17 August 2023.

After departure, the aircraft flew south as planned towards Earls Colne, at an altitude of about 2,100 ft amsl. The planned flight distance was approximately 40 nm and the estimated flight time around 25 minutes.

Figure 1 shows the aircraft's planned route and its actual track flown. A visible satellite image provided from the Met Office, showing the approximate location of low cloud and/or fog at 0745 hrs, is overlaid.

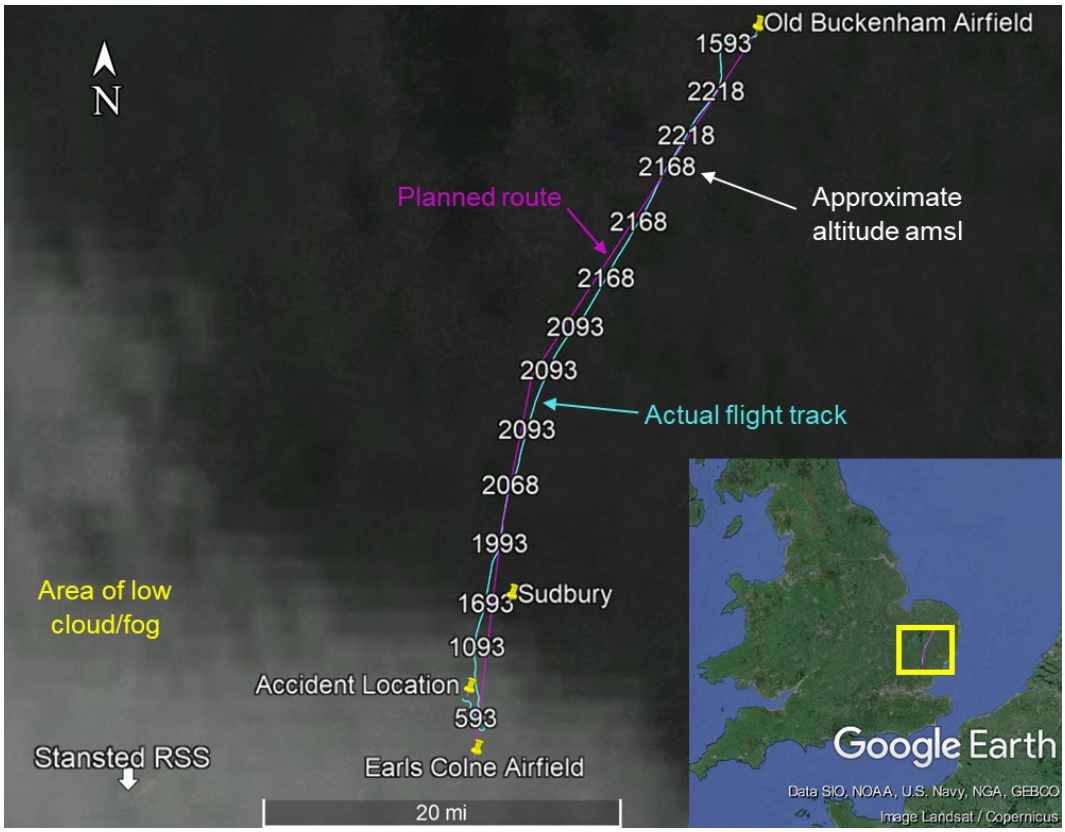


Figure 1

Planned route and actual flight track, with fog/cloud overlaid.
© 2023 Google, Image © Landsat / Copernicus

At approximately 0805 hrs and 8 nm north of his destination, the pilot called Earls Colne Radio stating that he was "abeam Sudbury, inbound at 1,500 ft" and requested the airfield details. The radio operator responded by passing details of the runway in use,

the QNH/QFE and the wind speed and direction. Earls Colne had been in fog from earlier in the morning and conditions were reported as being “very bad”. The resident air ambulance unit declared its helicopter ‘off-line’ at 0630 hrs due to the weather. The radio operator did not report the reduced visibility and low cloud to the pilot of G-AYUH on the radio. The radio exchanges between the pilot and the Air Ground Communication Service (AGCS) at Earls Colne were not recorded and were not required to be.

As G-AYUH approached Earls Colne, it began to descend at a location consistent with the edge of the band of low cloud / fog captured by the Met Office satellite image. The aircraft continued at an altitude of around 500 ft amsl (approximately 250 ft aal for Earls Colne).

At approximately 0815 hrs the radio operator, now joined by a colleague in the radio room, noted that G-AYUH had disappeared from the screen of an electronic conspicuity tracking website which was used by the radio operators to aid the monitoring of aircraft in the vicinity. The pilot then transmitted that he was at 500 ft, entering ‘*thick cloud or fog*’ and was returning to Old Buckenham. A witness working on a roof in the area, who is a private pilot, reported seeing an aircraft approaching from the north, “trying to stay below the cloud”, which was “low at around 500 ft above the ground”. The witness lost sight of the aircraft as it passed between Colne Engaine and Halstead (2 km to the west), but a short time later saw it again briefly heading in a northerly direction having apparently turned around. The witness reported that the sound of the aircraft’s engine appeared constant and normal. Recorded data shows the aircraft making a 270° left turn over the village of Colne Engaine (Figure 2) then continuing in a north-westerly direction and climbing to approximately 1,100 ft amsl (860 ft agl), before continuing to the west.

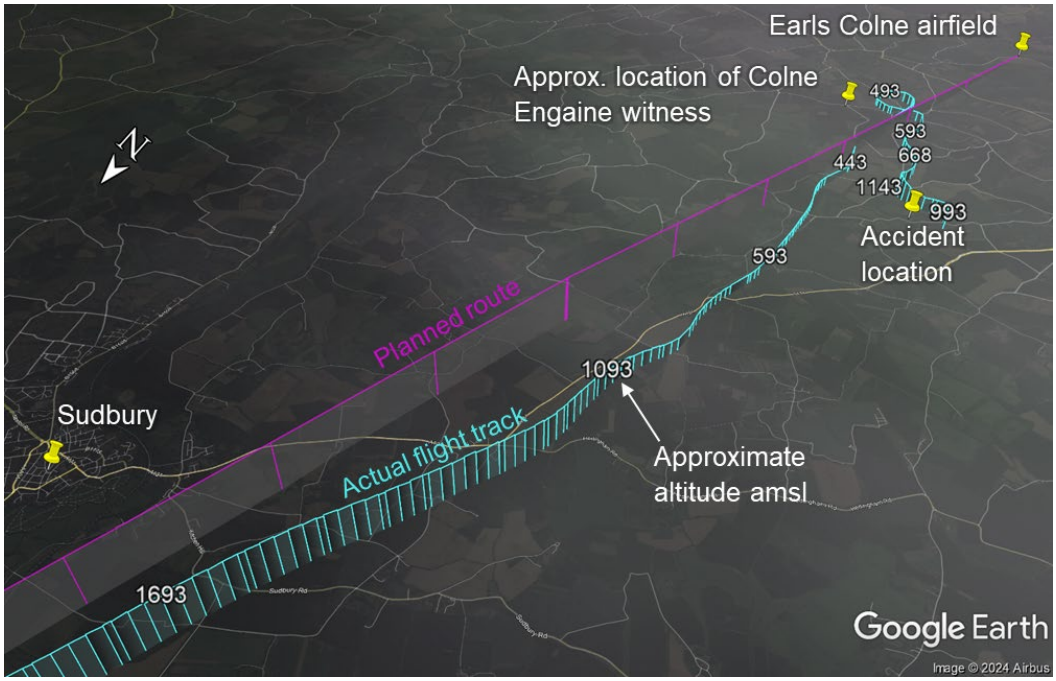


Figure 2

View from the north-west showing the planned route and actual flight track for the final part of the flight, with fog/cloud overlaid.
© 2024 Google

A witness at Stanley Hall (3 km north-west of Colne Engaine) heard an aircraft approaching from the south-east but could not see it due to the “very low cloud”. He reported hearing the sound of an engine revving up and down, and then the sound passing overhead in a northerly direction and apparently “quite low”. Recorded data shows G-AYUH descending to approximately 800 ft amsl (560 ft agl) near Stanley Hall and then resuming a climb.

The same witness then saw the aircraft emerge from the cloud about 100 m away, in a 45° nose-down attitude with the right wing oriented towards the ground such that the top surface of the wings was visible. The aircraft dropped out of sight behind a barn. The witness described hearing an “explosion” and then seeing black smoke rising behind the barn. The witness at Colne Engaine reported that shortly after losing sight of the aircraft they heard an engine sound as if full power was being applied, followed by a “sickening crash, like a crunching of metal”.

The aircraft came to rest in an inverted attitude in a field adjacent to an area of woodland, and there was a significant post-accident fire. Emergency services arrived on scene approximately 25 minutes later. The pilot was fatally injured in the impact.

Accident site

The accident site was approximately 3 nm north of Earls Colne Airfield at an elevation of 240 ft amsl. An aerial view of the site is shown in Figure 3.

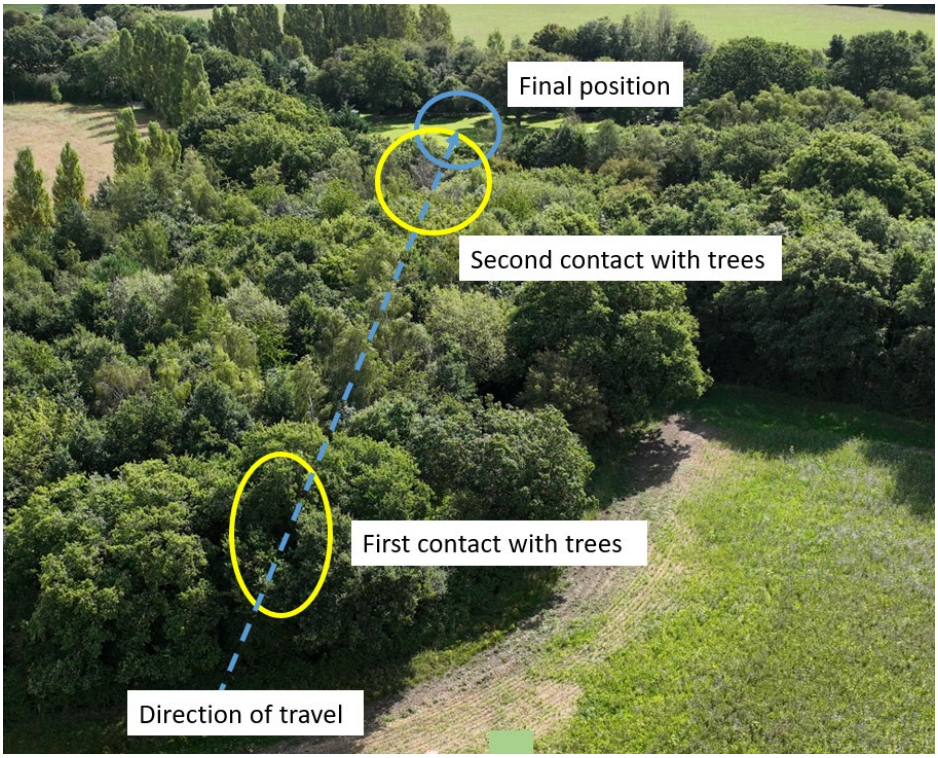


Figure 3

Aerial view of accident site

Inspection of the accident site and wreckage indicated that the aircraft first contacted the top of trees approximately 200 m before its final resting place. The initial contact was made by the right wingtip, evidenced by remains of the right wingtip green navigation light found on the ground underneath these trees. The second contact with the trees occurred approximately 75 m further along the path of travel. On the ground in this area were the remains of the left wingtip, red navigation light, and the beacon light mounted on top of the fin, along with pieces of clear plastic from the windows. This indicated that the aircraft was in a right-wing low attitude when it first contacted the trees and, by the time of the second contact, the aircraft was inverted with the left wing low. The aircraft continued in an inverted attitude until it came to rest in the grass field where the central part of the fuselage was consumed by the post-accident fire (Figure 4).

Figure 4

Final part of flight path through trees, looking along direction of travel

Preliminary examination of the wreckage, and in particular damage to the detached propeller and its attachment, indicated that the engine was producing power at the time of the impact. Both fuel tanks had been ruptured and no fuel remained but there was evidence of a significant post-accident fire. No pre-accident defects were identified.

Recorded information

The aircraft's avionics did not have any recording capability and were extensively damaged by the post-accident fire.

A significantly fire-damaged tablet was recovered from inside the aircraft, and a fire-damaged mobile phone was also retrieved from the accident site. The batteries of the tablet exhibited evidence of having combusted in the post-accident fire, exposing the internal circuitry to high temperatures. Some components on the circuit board had been displaced due to the high temperatures melting the solder joints. Some of the damage is shown in Figure 5.

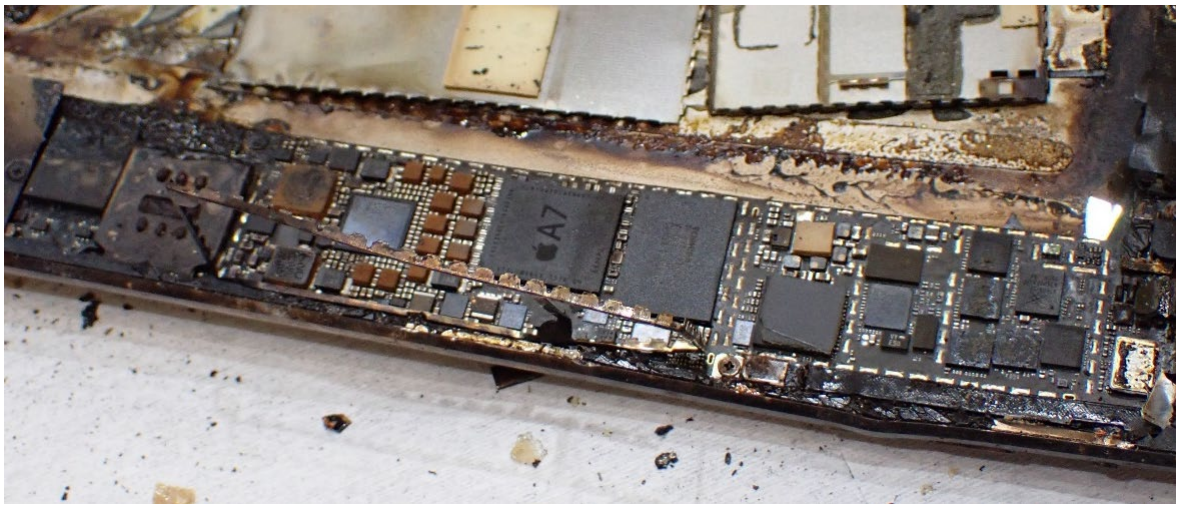


Figure 5

Circuit board from the fire-damaged tablet.

The AAIB did not recover any data from either the tablet or mobile phone.

Other data sources

G-AYUH was detected by both the primary surveillance radar (PSR) and secondary surveillance radar (SSR) at Stansted Airport until it reached the vicinity of the accident location. Detection by SSR indicates that G-AYUH's transponder was turned on and functional. Stansted's radar antenna is a combined PSR and SSR which sweeps the area every 4 seconds. Historic radar recordings showed that aircraft in the vicinity of the accident site are detectable by Stansted's radar as low as 400 ft amsl[2] in most summertime conditions. This was also the case for G-AYUH shortly before the accident.

Footnote

[2] Mode-S radar altitude resolution is accurate to ± 25 ft.

G-AYUH was last detected by Stansted radar close to the accident site at about 1,000 ft amsl. The next radar sweep did not detect the aircraft, either because the transponder antenna was obscured by an unusual aircraft attitude which also presented insufficient surface area to be detected by primary radar, or because it had rapidly descended below the radar's lower limit of coverage.

The AAIB obtained the pilot's SkyDemon data, which included a flight plan for the accident flight and two additional flight plans for the training routes intended to be flown later that morning. All three flight plans had a date stamp indicating they were last modified on 20 August 2023.

The AAIB obtained the ground-recorded position, speed and altitude data transmitted from G-AYUH by a PilotAware Rosetta unit, which corroborated the Stansted radar data.

Interpretation of available data

The Mode-S groundspeed and track information for the final four minutes of the flight from the radar returns and PilotAware are shown in Figure 6. Weather reports at Wattisham and Stansted around the time of the accident indicated light winds from the south-west, with a windspeed of about 6 kt. Therefore, calculated airspeeds may differ by up to ±6 kt from the groundspeeds shown.

The start of G-AYUH's left turn over Colne Engaine is indicated by point A. G-AYUH then exited the turn flying west, later turning right to fly north in the direction it arrived from (point B). G-AYUH continued in this general direction and climbed to reach about 1,100 ft amsl, approximately 20 seconds before the last recorded position.

At point C, the calculated groundspeed from online tracking data was 52 kt and from radar it was 60 kt. The latter value is considered to be an overestimate due to errors which are normally expected in radar position measurements. The data indicates the aircraft then commenced a left turn and its altitude started to decrease, whilst groundspeed increased.

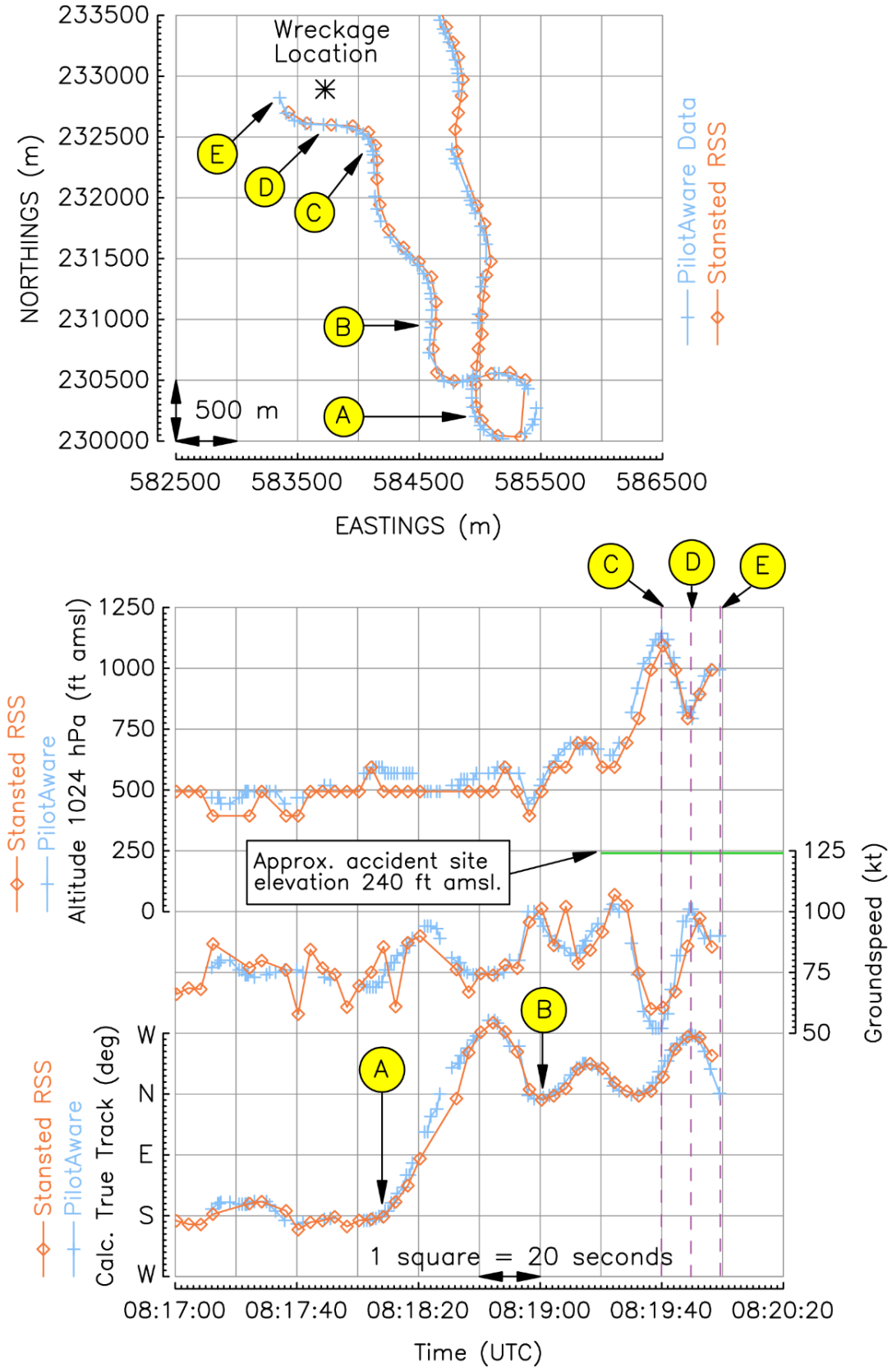


Figure 6

Altitude, groundspeed and heading from radar and PilotAware data, with an insert showing a plan view of the aircraft's recorded positions.

The aircraft's track began to move towards the north from a westerly heading, marked by point D in Figure 6, at up to 10 °/s [3]; the calculated groundspeed reached a maximum of about 100 kt at this point. This coincided with the aircraft entering a second climb from an altitude of about 800 ft amsl with reducing groundspeed.

The final recorded data point (point E) six seconds later indicated that G-AYUH reached approximately 1,000 ft amsl and was heading north. The calculated vertical speed between points D and E was approximately 2,000 ft/min.

CCTV

Both Old Buckenham and Earls Colne airfields had CCTV which was recorded. The CCTV at Old Buckenham Airfield showed the aircraft taking off in clear sky conditions at 0753 hrs (Figure 7). The departure appeared normal.

Figure 7

CCTV of G-AYUH departing from Old Buckenham (used with permission).

CCTV at Earls Colne Airfield (Figure 8) did not show the aircraft but provided evidence of the meteorological conditions at the following times; when the radio operator arrived at the airfield; when the pilot took off from Old Buckenham; at the approximate time the aircraft turned around over Colne Engaine (about 2 minutes before the accident), and approximately 10 minutes after the accident. The timestamps shown are converted to UTC from the embedded video timestamps.

Footnote

[3] To achieve a 10 °/s turn in level flight and at 100 kt IAS requires bank angle of approximately 43°.

Land features annotated in yellow correspond to distances referenced on a 'Visibility Indicators' chart which was affixed to a window in the radio room.

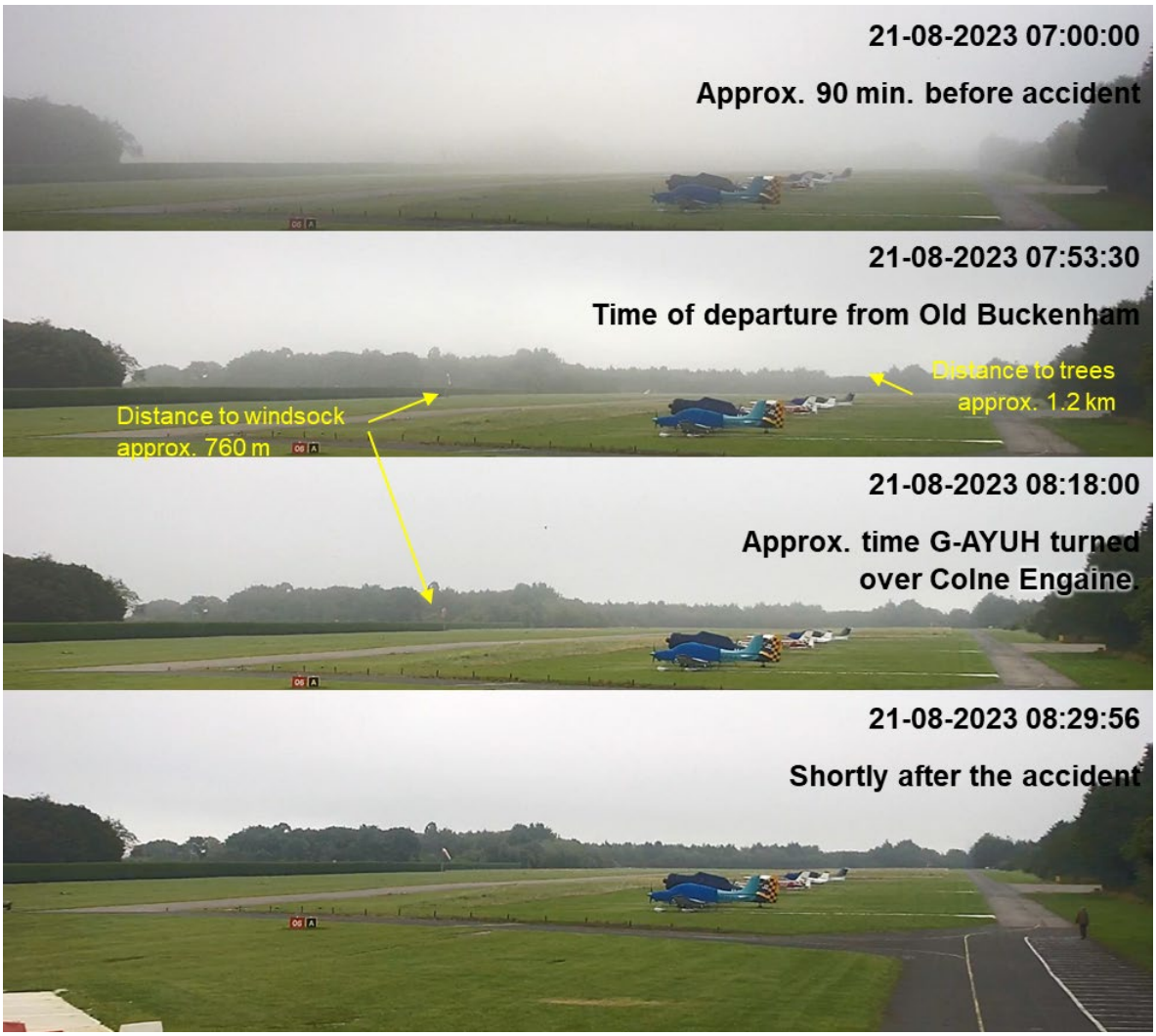


Figure 8

Snapshots from CCTV footage at Earls Colne, showing changing visibility in the area.

Aircraft examination

General description of the aircraft

The PA28 is a four seat, low wing monoplane of conventional design and is constructed primarily of aluminium. It is powered by a carburetted, four-cylinder piston engine driving a metal fixed pitch propeller. Fuel is carried in two integral wing tanks, one in each wing, with a total capacity of 50 USG. A fuel selector in the cockpit has three pilot-selectable positions: LEFT tank, RIGHT tank, and a guarded OFF position. The aircraft was equipped for flight in IFR conditions. A pilot-selectable cabin heater was fitted; it uses a heat exchanger to take heat from the metal parts of the engine exhaust system to warm fresh air for the passenger cabin. A portable electronic carbon monoxide detector was mounted on the instrument panel to detect any exhaust leaks; its battery had been replaced recently.

Maintenance information

The aircraft was maintained by an approved maintenance organisation. A review of the maintenance records showed that the aircraft had been maintained as required. Recent maintenance checks had identified one of the engine's cylinders was slightly low on compression. The compression value was within the engine manufacturer's limits for continued service, and it was being monitored for any further deterioration by the maintenance organisation in accordance with standard aviation practice. The owners were discussing options for future remedial work should it become necessary.

Fuel quantity

From the owner's records, records held by the aircraft's home airfield and the pilot of the previous flight, it was determined that the aircraft had departed with full fuel tanks. The aircraft therefore contained 48 USG of useable fuel of the correct grade; sufficient for over 4.5 hours of flying at the maximum cruise power setting.

Detailed examination of the wreckage

The aircraft wreckage was recovered to the AAIB facilities at Farnborough, Hampshire for further examination. The engine and its exhaust system were relatively intact but had suffered impact damage. No defects that could have contributed to the accident were identified with these components. The exhaust heat exchanger for the cabin heat was disassembled and found to be in good condition with no cracks or leaks. Examination of the remainder of the aircraft was limited due to the substantial effects of the post-accident fire. Within this limitation and examination of the aircraft log books, no pre-existing defects or anomalies that may have contributed to the accident were identified.

Meteorology

Met Office forecast and analysis

The Surface Analysis Chart published by the Met Office (Figure 9), valid for 0600 hrs on Monday 21 August 2023, shows an area of high pressure over southern UK and northern France. The south-east of the UK was therefore experiencing settled conditions with slack south-westerly winds.

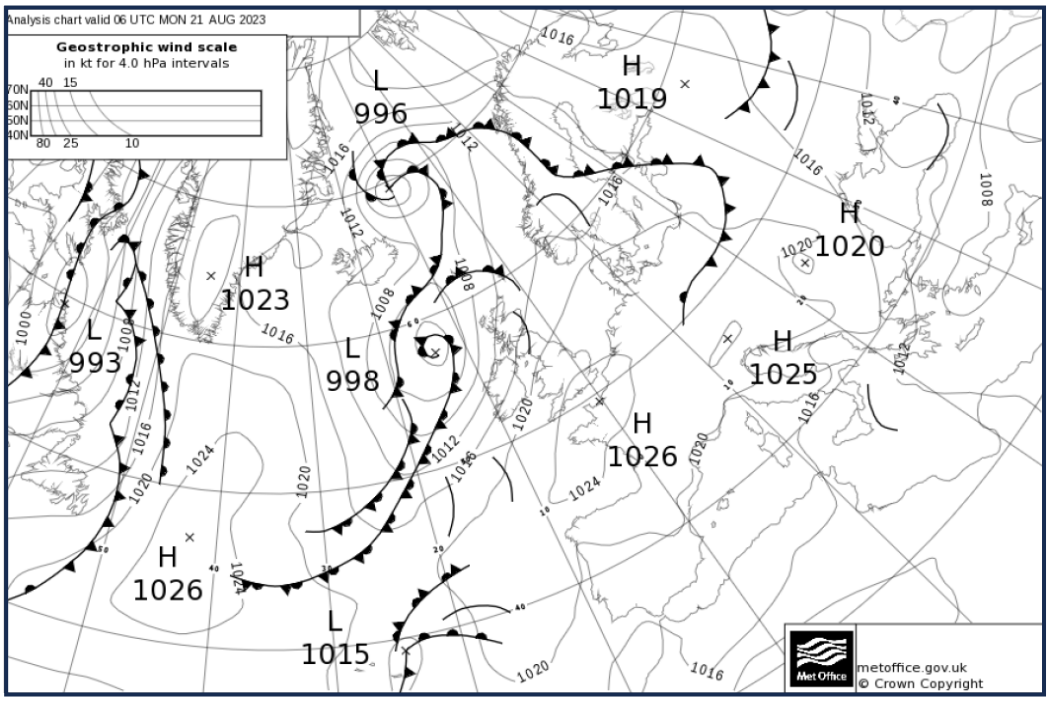


Figure 9

Surface Analysis Chart valid 0600 hrs Monday 21 August 2023

The Met Office published Low Level Significant Weather Charts (Form 215 – Figure 10) at 1514 hrs and 2053 hrs on Sunday 20 August 2023 (valid for 0000 hrs and 0600 hrs on Monday 21 August 2023). The flight was planned to be conducted within Area C, however the boundary of Area B would slowly approach the area of the planned flight overnight before retreating back to the south-west. The conditions within Area C were expected to be generally good with 35 km visibility, although this was forecast to reduce to 3,000 m in mist (BR) or 300 m in fog (FG)[4] over land (LAN) after 2200 hrs on 20 August, before clearing by 0800 hrs or 0900 hrs (0900 or 1000hrs local time) on 21 August. Occasional (OCNL)[5] scattered or broken (SCT/BKN) amounts of cloud between 2,500 and 3,500 ft were expected, however isolated (ISOL)[6] scattered or broken cloud between 300 and 600 ft was expected to develop at times in the south of Area C, lowering to the surface in the presence of fog.

Footnote

[4] Fog is defined as a reduction in visibility to less than 1,000 m due to suspended water droplets. In effect, it is cloud on the ground.

[5] Occasional: implies infrequent conditions which can be avoided. 25 – 50% of the area affected.

[6] Isolated: implies isolated conditions occurring randomly and which can easily be avoided. < 25% of the area affected.

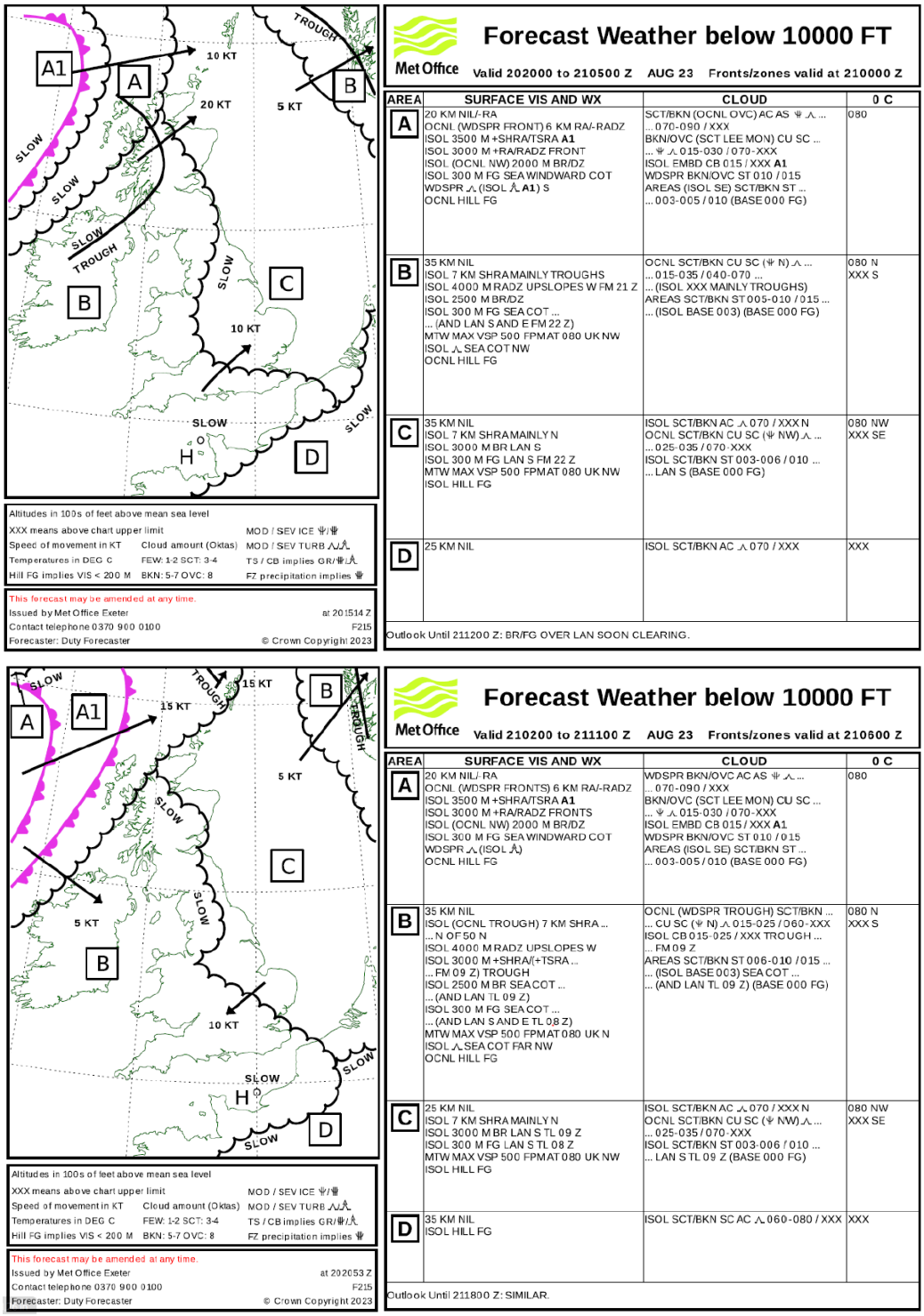


Figure 10

F215 Low Level Significant Weather Charts for 0000 hrs and 0600 hrs 21 August 2023

A visible satellite image taken at 0745 on 21 August 2023 (Figure 11) shows that the frontal edge of the cloud had moved across the area of Earls Colne.

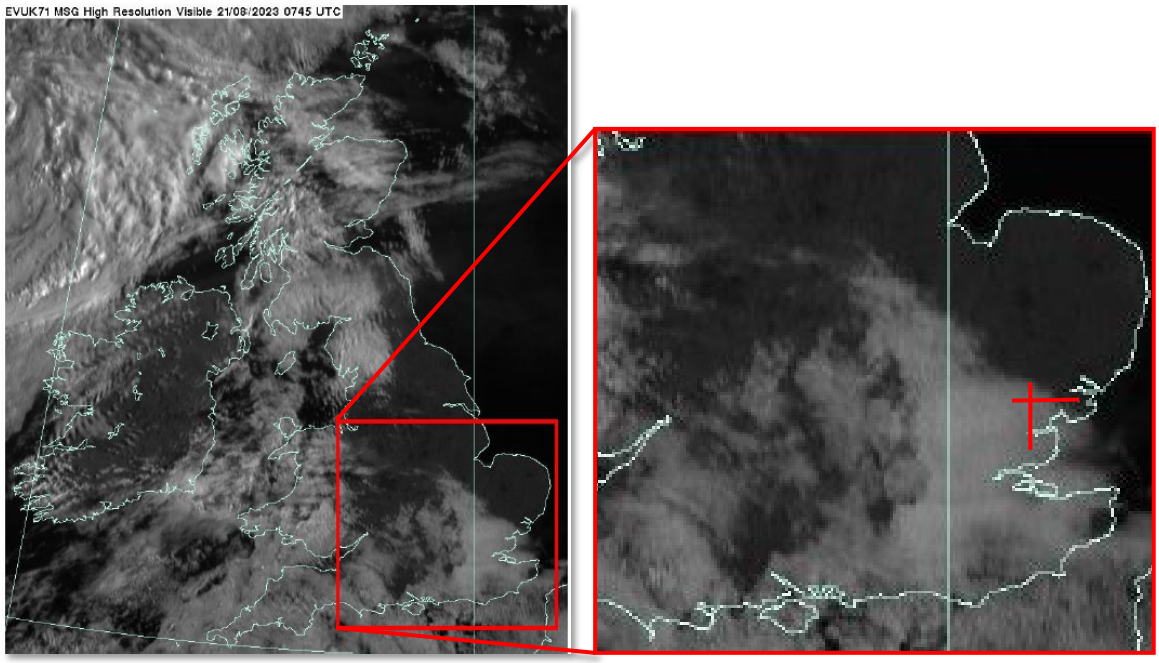


Figure 11

Visible satellite image taken at 0745 hrs on 21 August 2023 – intersection of red lines on right image shows approximate position of Earls Colne Airfield (© Met Office)

An infra-red satellite image taken 0700 hrs on 21 August 2023 (Figure 12) also shows cloud across the area of interest, but it appears less distinct than the visible satellite image. This indicates that the temperature of the cloud tops was close to the surrounding surface temperature, so at a very low level. The Met Office informed the AAIB that this is indicative of the presence of fog.

Visible and infra-red satellite imagery is available to pilots from the Met Office Aviation Briefing Service[7]. A range of pilot training resource is also available on the Met Office website[8]. Additionally, the Skyway Code published by the CAA contains information on pre-flight preparation and weather-related decision making[9].

Footnote

[7] Available at https://www.metoffice.gov.uk/services/transport/aviation/regulated/aviation-briefing-service-guidance [accessed 29 May 2024].

[8] Available at https://www.metoffice.gov.uk/services/transport/aviation/regulated/pilot-resources [accessed 29 May 2024].

[9] Available at https://www.caa.co.uk/general-aviation/safety-topics/the-skyway-code/ [accessed 29 May 2024].

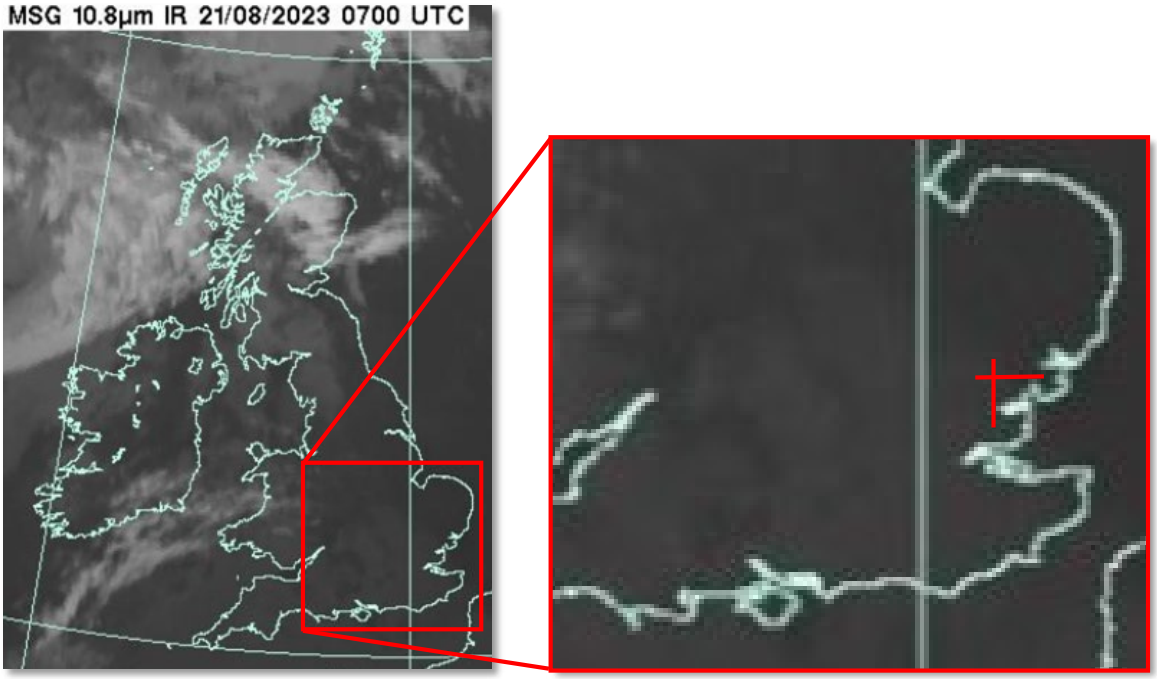


Figure 12

Infra-red satellite image taken at 0700 hrs on 21 August 2023 - intersection of red lines on the right image shows the approximate position of Earls Colne Airfield (© Met Office)

The bank of fog started to affect Stansted Airport (30 km west of Earls Colne) at around 0450 hrs on 21 August as it moved towards the area from the south-west. Stansted's 0450 hrs METAR reported a Runway Visual Range for Runway 22 of 650 m, decreasing in fog. The cloud was reported as overcast at 100 ft above the airport[10]. The presence of fog, then low cloud, continued to be reported at Stansted for the rest of the morning. The first TAF to raise the risk of fog was issued at 0440 hrs on 21 August.

TAFs produced for Wattisham Airfield (15 km NE of Sudbury) indicated good conditions for the morning of 21 August with light south-westerly winds, good visibility and no significant cloud. The METARs recorded at 0650 and 0720 hrs reported CAVOK conditions.

The Met Office provided the following opinion on the availability of meteorological planning information for the flight:

> *'A general aviation pilot would be able to see the cloud in the Visible satellite imagery, and by comparing to the Infra-Red images would be able to determine the presence of fog. However this would require a background knowledge of the differences between the two images. In addition to this the presence of fog was forecast in the Significant Weather charts issued on the 20th and the 21st. Although there was no mention of fog in the TAFs for the local area issued on the 20th the first TAF to raise a risk of fog was issued at 0440UTC on the 21st for Stansted, and would therefore been available for flight briefing after this time.'*

Footnote

[10] The elevation of Stansted Airport is 348 ft amsl.

A witness who worked at Earls Colne Airfield reported that the weather at Sudbury at 0615 hrs was cloudless with good visibility. As they approach Earls Colne village the weather conditions deteriorated such that by the time they drove past the threshold of Runway 24, some 30 minutes later, the windsock on the airfield was obscured by fog.

Following the accident, a police helicopter attended the scene at 0902 hrs. The pilot reported that the cloud base at the accident site was at 500 ft agl, and 300 ft agl at Earls Colne.

Geographic limits of TAFs and METARs

ICAO Doc 8896 – *Manual of Aeronautical Meteorological Practice* defines the geographic limits of TAFs and METARs as:

- **TAFs***: 'Forecasts of weather phenomena are for the area at the aerodrome, i.e. the area within a radius of approximately 8 km of the aerodrome reference point. The word "approximately" is used to cater for aerodromes that have perimeters which are not precisely a radius of 8 km from the aerodrome reference point. Forecasts of cloud are for the aerodrome and its vicinity, i.e. the area within a radius of approximately 16 km of the aerodrome reference point.'*

- **METARs**: in addition to the requirement for present weather information to be representative of the conditions within a radius of approximately 8 km of the aerodrome reference point, it should be representative *'for certain specified present weather phenomena*[11]*, in its vicinity, i.e. the area that lies within a radius of approximately 8 km and 16 km of the aerodrome reference point.'*

Meteorological information available on SkyDemon application

The investigation could not determine which sources of meteorological information the pilot consulted to plan the flight on 21 August 2023. However, it was found that he routinely used the SkyDemon flight planning and navigation application. A printed Pilot Log for the flight produced on the application was recovered from the accident site, but it did not include any meteorological information.[12]

SkyDemon can show a Virtual Radar display which graphically depicts some conditions in a TAF or METAR published for an aerodrome. SkyDemon provided the AAIB with an example (Figure 13) for an aerodrome reporting fog in a METAR.

Footnote

[11] Specified present weather phenomena includes precipitation and visibility factors such as fog, mist or haze.
[12] Users can select the contents of a 'Briefing Pack' for printing from the Pilot Log, Enroute Charts, Virtual Radar, Airfield Information, weather, NOTAM and Weight & Balance.

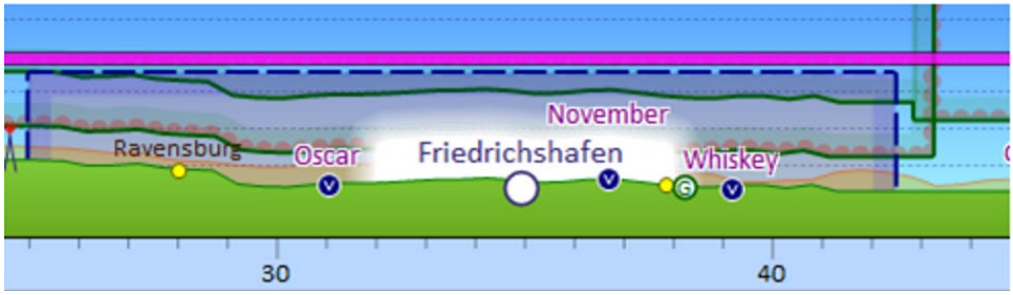


Figure 13

Example of the SkyDemon Virtual Radar display depicting fog (used with permission)

Weather information is automatically downloaded along a route as it is planned by the user and overlaid in the Virtual Radar window. The graphic displays a column that contains the relevant condition in the METAR[13] and is not intended to indicate that those conditions will be observed within a particular distance of the aerodrome shown on the display. This information cannot be displayed in flight, however full TAF and METAR details for relevant aerodromes can be accessed in a separate window when selected, either on the ground or in flight.

Aerodrome information

Earls Colne Airfield is situated six kilometres south-east of Halstead in Essex at an elevation of 227 ft amsl. It is a licensed airfield operating seven days per week and hosts an air ambulance helicopter unit. All aircraft arrivals are strictly PPR by telephone.

Provision of AGCS

Earls Colne operates an AGCS, call sign 'Earls Colne Radio', and the radio operators of this service hold a Radio Operator's Certificate of Competence (ROCC) issued by the CAA. The role and responsibilities of a radio operator is described in the Aerodrome Manual, which includes the provision of '*advisory information*' to pilots such as:

- Active runway and circuit direction.
- Indicated surface wind direction and speed.
- QNH / QFE.
- ATZ traffic in general terms.

Information on wind direction was obtained by reference to a windsock on the airfield and the wind speed reported at Stansted Airport which was available to the radio operators through Stansted's ATIS broadcast.

To assist the radio operators to determine the prevailing visibility there was a '*Visibility Indicators*' chart displayed on the window of the radio room which indicated distances, in metres, to features on and around the airfield.

Footnote

[13] Conditions that can be displayed are cloud layers, rain, snow and visibility (including fog and mist).

Additional duties involved the provision of PPR telephone briefings to visiting pilots in order to:

> *'Provide clear concise information on the runway condition, runway in use, circuit pattern / height, surface wind, advise noise abatement procedures are to be found on the…web site. Be able to discern from the response if the information has been understood.'*

Radio operators

When the pilot of G-AYUH made his initial radio call to Earls Colne Radio, the radio operators on duty shared a common belief that the privileges of a ROCC did not allow them to report weather conditions to pilots, except wind direction and speed. This was based primarily on their training and the fact that they were not qualified Aerodrome Meteorological Observers (AMOs)[14]. However, they acknowledged that they could relay weather conditions that had been passed to them by other pilots.

The ROCC training syllabus, contained in CAP 452[15], does not cover meteorological observations. Neither is the subject covered in CAP 1439, '*Guidance for examiners of aerodrome air-ground radio station operators*', which contains examples of ROCC written exam questions. This was confirmed by the CAA-authorised examiner who provided the training to the radio operators.

The radio operator who received the telephone PPR from the pilot on the day before the accident flight informed the AAIB that had the pilot telephoned before taking off, he would have told him that Earls Colne was experiencing fog. This was attributed to the fact the conversation was by telephone and not subject to the limitations the radio operator believed were imposed by the terms of his ROCC.

Aerodrome Manual

The Aerodrome Manual for Earls Colne stated that in poor weather conditions:

> *'The runway will not be closed for reasons of poor visibility or low cloud base. The decision to take off or land rests with the pilot which he / she may do despite being advised to the contrary unless Appendix 1 Termination of flight conditions[16] are deemed necessary.'*

Footnote

[14] Civil Aviation Publication 746: 'Requirements for meteorological observations at aerodromes', Issue 6, 2023, provides guidance on the requirements, training and qualification for AMOs. Available at https://www.caa.co.uk/publication/download/12602 [accessed 29 May 2024].

[15] Civil Aviation Publication 452: 'Aeronautical Radio Station Operator's guide', Edition 15, 2016. Available at https://www.caa.co.uk/publication/download/15805 [accessed 29 May 2024].

[16] Appendix I Termination of flight conditions refers to the authority of the Managing Director to prevent the commencement or continuation of any flight under certain conditions laid out in the Air Navigation Order, but not weather related.

The airfield operator informed the AAIB that they had no previous experience of visiting pilots attempting to approach the airfield when the weather was substantially below VFR limits. As such, they had not identified this as a potential hazard in their Risk Register or implemented specific measures to mitigate the risk.

AGCS

CAP 452, together with CAP 413, *'Radiotelephony Manual'*, are intended to provide *'the main reference documents for radio station operators'*. CAP 452 states that:

> *'AGCS radio station operators provide traffic and weather information to pilots operating on and in the vicinity of the aerodrome. Such traffic information is based primarily on reports made by other pilots. Information provided by an AGCS radio station operator may be used to assist a pilot in making a decision; however, the safe conduct of the flight remains the pilot's responsibility.'*

CAP 452 does not, however, provide further detail on the nature or content of '*weather information*' that may be provided to pilots. Similarly, there is no clarification in CAP 413.

In a later section on Operational Control Communications (OPC)[17], CAP 452 states that only flight regularity and flight safety messages may be transmitted under the remit of OPC. An example of a flight safety message is listed as,

> *'Meteorological advice of immediate concern to an aircraft in flight or about to depart (individually communicated or for broadcast).'*

A ROCC is not required to operate a ground radio when providing an OPC.

Previous AAIB investigations involving the provision of an AGCS

In the report into the accident involving G-OMAG and N68427[18] in 2021, where the aircraft collided on the runway at Dunkeswell Aerodrome, the AAIB found that CAP 452 provided insufficient guidance to licence holders on the delivery of an AGCS. In response, on 4 August 2022, the CAA published Supplementary Amendment 2022/01 to CAP 452[19], providing an update to the requirements for ROCC holders.

The amendment clarified that,

> *'The purpose of the ROCC AGCS/OCS is to improve the situational awareness for Pilots and to assist them by providing information that is useful for the safe and efficient conduct of flights.*

Footnote

[17] Operational Control Communications is an aeronautical radio station licensed and established for communication between an operator and their aircraft.

[18] Available at https://www.gov.uk/aaib-reports/aaib-investigation-to-cessna-182b-g-omag-and-boeing-stearman-a75n1-pt17-n68427 [accessed 29 May 2024].

[19] Available at https://www.caa.co.uk/publication/download/19841 [accessed 29 May 2024].

The information passed by an ROCC operator shall not be considered an instruction and does not substitute for pilot's responsibility to ensure the safe operation of their aircraft at all times.'

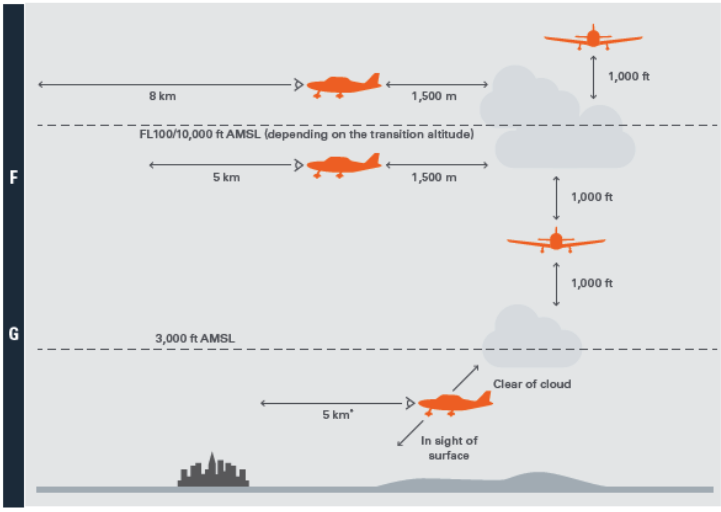
And that,

'Any information provided by the ROCC operator does not relieve the pilot-in-command of an aircraft of any responsibilities.'

Flight planning

Flight in accordance with VFR

Regulations governing flight in accordance with VFR are contained in the UK Standardised Rules of the Air Regulation[20]. The following extract from the Skyway Code[21] provides a graphical representation of VFR in Class G airspace (Figure 14).



Altitude band	Airspace class	Flight visibility	Distance from cloud
At and above 10,000 ft AMSL/FL100	A B C D E F G	8 km	1,500 m horizontally 1,000 ft vertically
Below 10,000 ft AMSL/FL100 and above 3,000 ft AMSL, or above 1,000 ft above terrain, whichever is the higher	A B C D E F G	5 km	1,500 m horizontally 1,000 ft vertically
At and below 3,000 ft AMSL, or 1,000 ft above terrain, whichever is the higher	A B C D** E	5 km	1,500 m horizontally 1,000 ft vertically
	F G	5 km*	Clear of cloud and with the surface in sight

VFR is not permitted in class A airspace, inclusion of VMC minima is for reference only.

***Class G exception:** In UK class G airspace the 5 km requirement may be reduced to 1,500 m, if flying by day, in sight of the surface and at 140 kts IAS or less.

****Class D exception:** Under the following circumstances you may fly 'clear of cloud' in class D airspace, without complying with the specific cloud separation distances: by day at or below 3,000 ft AMSL, in sight of the surface and at 140 kts IAS or less. 5 km visibility is still required, except for helicopters for which 1,500 m is required. Note this is a UK difference from Part-SERA as applies in the EU.

Figure 14

Graphical representation of Visual Flight Rules

Footnote

[20] UK Regulation (EU) No 923/2012, available at https://regulatorylibrary.caa.co.uk/923-2012-pdf/PDF.pdf [accessed 29 May 2024].

[21] Available at https://www.caa.co.uk/general-aviation/safety-topics/the-skyway-code/, page 65 [accessed 29 May 2024].

In UK class G airspace below 3,000 ft amsl, or 1,000 ft above terrain, whichever is the higher, the 5 km visibility requirement may be reduced to 1,500 m, if flying by day, in sight of the surface and at 140 kt IAS or less. The Skyway codes states on page 39 that:

> *'For operations in class G airspace, the VFR minima may allow an in-flight visibility as low as 1,500 m, provided you remain clear of cloud. The cloud height is often the limiting factor – in conditions of 1,500 m visibility, the cloud height would normally force you to fly dangerously low. The legal minima are not a good reference point for decision making because safe VFR flight normally ceases to be possible long before the visibility is that poor. They are limits not targets.'*

On page 40, the Skyway Code offers the following advice regarding VFR flight with a cloud ceiling of 1,500 ft agl or less:

> *'VFR flight with a cloud ceiling of 1,500 ft or less above ground level (AGL) requires particular attention to terrain and obstacles. Flight below 1,000 ft AGL is normally only suitable for circuits around the aerodrome or local flying in areas you are familiar with.'*

And where the cloud ceiling is sufficiently high:

> *'VFR flight when the surface visibility is being reported as less than 5 km is not recommended. You are unlikely to have a clear horizon to control the aircraft, and navigating visually will be difficult.'*

Pilot information

The pilot held a UK Private Pilot's Licence, first issued in 1979, then renewed in 2014. He had flown a total of 407 hours, mostly on PA-28s. He joined the G-AYUH syndicate in 2021 and underwent 3.5 hours of training with a local instructor at Old Buckenham. That training did not include instrument flying and was not required to do so. The pilot had logged 5 hours of instrument flying in the past, but it was not possible to determine when this occurred. Logbook evidence available to the investigation contained entries from September 2022 and there were no entries for instrument flying except a record of the cumulative total. The pilot did not hold an instrument rating.

The pilot's SEP rating was valid until 31 October 2024 and he last conducted biennial training on 25 September 2022. Biennial SEP revalidation flight tests, or the alternative of one hour of flight training with an instructor where the pilot achieves the required minimum hours, does not require any training on inadvertent entry into IMC or for pilots to demonstrate recovery from simulated entry to IMC.

CAA-directed training

The pilot was flying to Earls Colne to conduct a training package that had been directed by the CAA. He was required to complete the training by 27 August 2023. On 26 July 2023

he arranged with the training provider to undertake the flying element of the package on 21 August 2023 at Earls Colne. In preparation for that event, he flew to Earls Colne on 17 August to meet his instructor and discuss the requirements.

The AAIB was informed by the training provider that whilst the CAA had set the deadline of 27 August 2023 to complete the training, an extension could be sought where there were good reasons to do so. The investigation was not able to determine whether the pilot was aware of this option.

Medical

The pilot held a current CAA Class 2 medical, which was valid until August 2024.

Post-mortem report

Post-mortem examination of the pilot revealed no evidence of incapacitation before the accident or the presence of carbon monoxide. Injuries sustained during the impact were not survivable.

Analysis

Overview

The accident sequence began when the aircraft entered metrological conditions that were less than those required for flight in accordance with VFR. When the pilot recognised this and attempted to return to his aerodrome of departure, the aircraft departed from controlled flight. The pilot died from injuries sustained when the aircraft struck the ground. The post-mortem examination determined that there was no indication of medical impairment or incapacitation of the pilot before the aircraft struck the ground.

The accident

A review of the maintenance documentation indicated the aircraft had been maintained to the required standard and the examination of the wreckage did not identify any anomalies or defects that could have contributed to the accident. The fuel on board was more than sufficient for the intended flight and damage to the propeller and its mounting indicated that the engine was producing power at the time of the accident.

Following the turn at Colne Engaine, G-AYUH climbed from approximately 500 ft amsl (260 ft agl) to 1,100 ft amsl (860 ft agl) as the pilot likely attempted to gain separation from the ground in weather conditions that were either IMC or, at best, a degraded visual environment. It then commenced a turn to the left and immediately descended to 750 ft amsl (510 ft agl) before climbing again whilst reversing the turn to the right.

From the last recorded position and the orientation of the final wreckage location, it is likely that G-AYUH continued in a right turn. A combination of Stansted radar's rotation period and the likely low radar cross-section presented by the aircraft, did not allow for a detailed analysis of the final descent. However, witness evidence of G-AYUH's attitude as it emerged below cloud, combined with the release of aircraft components in the wreckage path, indicated that the aircraft continued in a descending right turn until the point of impact with the trees.

Planning and decision to fly

The investigation found that the pilot had planned the flight to Earls Colne, and his subsequent training flights for the day, using the SkyDemon application. The application can display weather information to a user in graphic and textual form. However, the 'Virtual Radar' display graphic can only show weather reported at an aerodrome that is in close proximity to the planned track. It would not have shown the presence of fog at Stansted, some 30 km to the west of Earls Colne. The pilot would have to review Stansted's METAR & TAF and interpret their significance for his planned route. However, the geographic limit of these forecasts and observations only extends to 16 km from the aerodrome, so further information would be required to establish an accurate picture of the conditions.

The Met Office Low Level Significant Weather Charts published at 1514 hrs and 2053 hrs on Sunday 20 August 2023 clearly indicated the likelihood of fog affecting the region of the planned flight on the following morning. The Met Office informed the AAIB that '*the first TAF to raise a risk of fog was issued at 0440UTC on the 21st for Stansted, and would therefore been available for flight briefing after this time'.* Similarly, the visible and infra-red satellite images showing the area to the east of Stansted affected by the fog were available before the planned departure. However, the Met Office advised that whilst a general aviation pilot '*would be able to see the cloud in the visible satellite imagery, and by comparing to the infra-red images would be able to determine the presence of fog',* that would require a '*background knowledge of the differences between the two images'.*

The AAIB did not find any evidence that the pilot had reviewed weather information from an aviation weather service provider, such as the Met Office, prior to the flight, and no meteorological information was found with the flight's paperwork. The CAVOK conditions at Old Buckenham on the morning of the flight may have led him to believe that the weather was suitable for the route to Earls Colne. METARs for Wattisham also declared CAVOK conditions, which may have reinforced his belief.

The pilot phoned Earls Colne to register his PPR on the evening before the flight as he planned to take off before they opened for operations. During the phone call the radio operator suggested that the pilot call again before departure the following morning to confirm the airfield conditions. However, The AAIB did not find any evidence of the pilot calling before he departed Old Buckenham. Had he done so, the radio operator stated that he would have informed him of the foggy conditions as phone conversations were not subject to the same restrictions as radio communication.

The pilot had a motivation to be at Earls Colne early in the morning to undertake a day of training directed by the CAA. The training provider informed the AAIB that whilst the CAA had set the deadline of 27 August 2023 to complete the training, an extension could be sought where there were good reasons to do so. The investigation could not determine whether the pilot was aware of this flexibility and could not rule out the possibility that a perceived sense of pressure to comply with the agreed training schedule influenced his decision to fly.

In-flight decision making

When the pilot of G-AYUH reported to Earls Colne Radio that he was abeam Sudbury at 1,500 ft amsl, it is probable that the prevailing conditions were VMC. Visible and infra-red satellite imagery shows the frontal edge of the bank of fog was still approximately three to four kilometres to his south. This was corroborated by witnesses who had driven from Sudbury to Earls Colne that morning. The aircraft's descent to about 500 ft amsl (260 ft agl) is consistent with the area of degrading visibility and low cloud associated with these conditions. It is likely that the pilot was descending to remain clear of cloud and remain in sight of the surface with the intention of landing at Earls Colne. However, he had not been informed of the presence of fog by the radio operator, which would have precluded a safe landing there.

The CAA publishes comprehensive guidance on flight under VFR in the Skyway Code and highlights the key hazard when weather conditions are close to published limits:

> *'The legal minima are not a good reference point for decision making because safe VFR flight normally ceases to be possible long before the visibility is that poor. They are limits not targets.'*

At the point the pilot informed Earls Colne Radio that he had entered '*thick cloud or fog*' and was attempting to return to Old Buckenham, the meteorological conditions would have presented a severe test of his flying skills with a high risk that the pilot would become spatially disorientated.

Manually flying an aircraft in IMC is a skill that requires training and currency to achieve safely. The pilot did not hold an instrument rating, and it was not possible to determine when in the past he undertook five hours of instrument flying training. There is no requirement for pilots to revisit the basic instrument flying skills taught in the PPL syllabus in subsequent licence revalidation checks. It is therefore likely that the pilot did not possess the current skills to safely control his aircraft on encountering IMC.

In the report into the fatal accident involving a Mudry Cap 10B, G-BXBU in 2021[22], where the pilot inadvertently encountered IMC, the AAIB made the following Safety Recommendation:

Safety Recommendation 2023-011

It is recommended that the Civil Aviation Authority publish guidance for general aviation pilots on responding to unexpected weather deterioration, highlighting the factors affecting their performance and the benefits of planning before the flight how they will respond.

Footnote

[22] Available at https://www.gov.uk/aaib-reports/aaib-investigation-to-mudry-cap-10b-g-bxbu [accessed 29 May 2024].

The CAA responded that:

'In addition to the guidance highlighted in the CAA's initial response to this safety recommendation, the CAA is also developing a new Safety Sense Leaflet (SSL) dedicated to inadvertent entry into Instrument Meteorological Conditions (IMC) when operating under Visual Flight Rules (VFR). The SSL will include guidance on planning to avoid a 'VFR into IMC' scenario and what actions to take if a pilot is confronted with deteriorating weather conditions and ends up in IMC when not appropriately qualified.'

The CAA subsequently published Safety Sense Leaflet 33: '*VFR Flight Into IMC*'[23], on 7 May 2024.

Communication

The radio operators who were on duty at Earls Colne did not feel empowered to inform the pilot of G-AYUH of the fog at the airfield when he radioed to request the airfield details. They had formed a collective view that the privileges of the ROCC did not permit them to pass meteorological information to an aircraft in flight unless it had first been relayed to them from another aircraft. This view had been influenced by a combination of their training, the airfield operator's expectation of their role, and the fact that they were not qualified metrological observers. The operator's Aerodrome Manual stated that *'The runway will not be closed for reasons of poor visibility or low cloud base'* and that the decision to take off or land rests with the pilot in command. The airfield operator informed the AAIB that they had no previous experience of visiting pilots attempting to approach the airfield when the weather was substantially below VFR limits. As such, they had not identified this as a potential hazard in their Risk Register or implemented specific measures to mitigate the risk such as empowering the radio operators to pass meteorological information that would be '*useful for the safe and efficient conduct of flight'*, as clarified in the Supplementary Amendment 2011/01 to CAP 452, published in August 2022.

Therefore, to prevent recurrence, the airfield operator has introduced the following additional processes:

- *Request any pilot who PPR`s in advance of the date they intend to arrive to call on the day of the flight to verify that the weather conditions are suitable for them.*
- *If an aircraft is due to arrive at Earls Colne and the weather has deteriorated at the airfield, and we have any pilot reports from other aircraft on the state of the weather, this information will be passed to the pilot inbound.*
- *If the weather has deteriorated at the airfield and there are no pilot reports available, then the inbound pilot will be provided with some key pointers using the following standards:*

Footnote

[23] Available at https://www.caa.co.uk/publication/download/21918 [accessed 29 May 2024].

- *Horizontal visibility at midpoint of runway and end of runway.*
- *'Unofficial' weather observations of prevailing conditions at the airfield.*
- *The frequency of Stansted Airport's ATIS.*

In discussion with AAIB, the CAA agreed that CAP 452 permitted providers of an Operational Control Communications service, who did not have to hold an ROCC, to pass '*Meteorological advice of immediate concern to an aircraft in flight or about to depart'.* This contrasted with operators of an AGCS who were not similarly empowered. Therefore, to clarify the roles and responsibilities of the holders of a ROCC, and to highlight those occasions when they should provide pilots with additional information for the purpose of alerting them to hazards and avoiding immediate danger, the CAA published Safety Notice SN-2024/001, *ROCC 'Flight Safety Messages' Requirement*[24]*,* on 30 January 2024. This Safety Notice, under '*Meteorological Information*' states:

'2.1 Information regarding adverse weather conditions (although this is not an official meteorological report) should be passed to aircraft concerned with the use of the following prefixes:

a) "reported by a pilot (at time)…." or
b) "unofficial observation"

2.2 Examples of meteorological information messages (this list is not exhaustive):

a) "Unofficial observation, fog observed to East".
b) "Departing aircraft (at time) reported low cloud base of approximately 200 ft".
c) "Windshear reported (at time) by landing aircraft on final approach".
d) "Thunderstorms reported by a pilot (at time)…."'

The CAA also published a Supplementary Amendment to CAP 452, *Aeronautical Radio Station Operator's Guide*, No. 2024/01 (Version 1)[25], on 16 February 2024 which provides the following introductory information regarding the ROCC 'Flight Safety Message' requirements:

'1.1 The purpose of the Radio Operator's Certificate of Competence (ROCC) Air-ground communication service (AGCS) and Offshore Communication Service (OCS) is to improve the situational awareness for pilots and to assist them by providing information that is useful for the safe and efficient conduct of flights.

1.2 ROCC holders are reminded of the requirement to consider 'Duty of care' to aircraft whilst operating on the AGCS/OCS frequency, and the importance of passing Flight safety messages, and additional safety information for the purpose of alerting aircraft of hazards and avoiding immediate danger. This

Footnote

[24] Available at https://www.caa.co.uk/publication/download/21096 [accessed 29 May 2024].
[25] Available at https://www.caa.co.uk/publication/download/21226 [accessed 29 May 2024].

includes timely information regarding adverse weather to an aircraft in flight or about to depart.

…

1.5 Information provided by an AGCS/OCS radio station operator may be used to assist a pilot in making a decision; however, the safe conduct of the flight always remains the pilot's responsibility.

…

1.8 Depending on the operational circumstance these messages including any Meteorological advice of immediate concern may be individually communicated or passed via a broadcast on the frequency.

1.9 Information regarding adverse weather conditions (although this is not an official meteorological report) should be passed to aircraft concerned with the use of the following prefixes "reported by a pilot (at time)…." or "unofficial observation".

1.10 Transmissions must be passed in a clear and concise manner ensuring the use of unambiguous language, plain language may also be used to pass these safety critical messages if required.'

To signpost the Safety Notice and Supplementary Amendment, on 16 February 2024 the CAA published Skywise alert SW2024/037 containing the following:

*'**ROCC 'Flight Safety Message' requirement***

To remind Radio Operator's Certificate of Competence (ROCC) holders of the requirement to pass urgent flight safety messages we have published a Supplementary Amendment to CAP452 - Aeronautical Radio Station Operator's Guide (SA 2024/01) and Safety Notice (SN-2024/001).

- CAP 452 SA 2024/01: ROCC 'Flight Safety Message' requirement
- SN 2024/001: 'Flight Safety Messages' Requirement

ROCC holders are also reminded of the previously published CAP 452 SA 2022/01: Update to requirements for ROCC Holders.

We have also updated our Radio Operator's Certificate of Competence guidance to include more detail on the purpose of the ROCC and the holder's responsibilities.

This action has been taken following an Air Accident Investigation Branch (AAIB) investigation into an accident and subsequent discussions between the AAIB and UK Civil Aviation Authority.'

Conclusion

The accident happened when the aircraft struck trees and terrain after departing from controlled flight. This was as a result of the aircraft entering meteorological conditions which were not compatible with VFR and were beyond the pilot's experience and capabilities.

Meteorological forecasts available prior to the flight indicated the likelihood of low cloud and fog in the vicinity of the destination airfield. There was no evidence that the pilot had contacted Earls Colne on the morning of the flight to confirm the prevailing weather conditions.

When the pilot requested the airfield details, the radio operators at Earls Colne did not inform him that the airfield was in fog. They had formed a collective view that in providing an AGCS, the privileges of the ROCC did not permit them to pass meteorological information to an aircraft in flight unless it had first been relayed to them from another aircraft.

The investigation identified an inconsistency in CAP 452 which permitted providers of an Operational Control Communications Service, which does not require radio operators to hold a ROCC, to pass '*Meteorological advice of immediate concern to an aircraft in flight or about to depart'.* This contrasted with operators of an AGCS who were not explicitly empowered to provide pilots with such information for the purpose of alerting them to hazards and avoiding immediate danger.

Examination of the aircraft did not identify any pre-existing defects or anomalies that may have contributed to the accident.

Safety action

The operator of Earls Colne Airfield has introduced the following additional processes:

- Request any pilot who PPR`s in advance of the date they intend to arrive to call on the day of the flight to verify that the weather conditions are suitable for them.
- If an aircraft is due to arrive at Earls Colne and the weather has deteriorated at the airfield, and we have any pilot reports from other aircraft on the state of the weather, this information will be passed to the pilot inbound.
- If the weather has deteriorated at the airfield and there are no pilot reports available, then the inbound pilot will be provided with some key pointers using the following standards:
    - *Horizontal visibility at midpoint of runway and end of runway.*
    - *'Unofficial' weather observations of prevailing conditions at the airfield.*
    - *The frequency of Stansted Airport's ATIS.*

To clarify the roles and responsibilities of the holders of a ROCC, and to highlight those occasions when they should provide pilots with additional information for the purpose of alerting them to hazards and avoiding immediate danger, the CAA has:

- Published Safety Notice SN-2024/001, ROCC 'Flight Safety Messages' Requirement.
- Published a Supplementary Amendment to CAP 452, Aeronautical Radio Station Operator's Guide, No. 2024/01 (Version 1) which provides further information regarding the ROCC 'Flight Safety Message' requirements.
- Published Skywise alert SW2024/037 to highlight Safety Notice SN-2024/001 and the Supplementary Amendment.

Published: 27 June 2024.