ACCIDENT

Aircraft Type and Registration:	1) Luscombe 8E Silvaire Deluxe, G-AKUI 2) Pacific Aerospace PAC 750XL, ZK-KAY
No & Type of Engines:	1) 1 Continental Motors Corp O-200-A piston engine 2) 1 Pratt and Whitney PT6A-34 turboprop engine
Year of Manufacture:	1) 1947 2) 2004
Date & Time (UTC):	16 December 2007 at 1158 hrs
Location:	Rectory Farm, near Rugeley, Staffordshire
Type of Flight:	1) Private 2) Private
Persons on Board:	1) Crew - 1 Passengers - 1 2) Crew - 1 Passengers - 2
Injuries:	1) Crew - 1 (Fatal) Passengers - 1 (Fatal) 2) Crew - None Passengers - None
Nature of Damage:	1) Aircraft destroyed 2) Left main landing gear separated, minor damage to nose landing gear and underside of fuselage and left wing
Commander's Licence:	1) Private Pilot's Licence 2) Private Pilot's Licence
Commander's Age:	1) 59 years 2) 39 years
Commander's Flying Experience:	1) 670 hours (of which 130 were on type) Last 90 days - Not known Last 28 days - Not known 2) 2,037 hours (of which 730 were on type) Last 90 days - 50 hours Last 28 days - 3 hours
Information Source:	AAIB Field Investigation

Synopsis

The pilot of ZK-KAY was flying under Visual Flight Rules (VFR) on a cross-country flight, tracking south-east, close to Blithfield Reservoir. The pilot and passenger of G-AKUI were on a local flight from their base near the reservoir. G-AKUI entered a turn to the right shortly prior to the collision, possibly to avoid a third aircraft which later radar analysis showed was near. Following the turn, with G-AKUI now on an easterly heading, the two aircraft collided. The weather was benign, with good visibility below a layer of cloud and a little haze. ZK-KAY sustained damage in the collision but landed safely at East Midlands Airport. G-AKUI

sustained severe damage and was rendered incapable of flight; it fell to the ground and there was a fierce fire. Both occupants of G-AKUI died in the impact.

The investigation identified factors which may account for the failure of the 'see and avoid' principle.

History of the flights

ZK-KAY

ZK-KAY, a Pacific Aerospace PAC 750, departed from its base at Cark airfield, Cumbria, on a VFR flight to Cranfield, where it was to receive routine maintenance. The aircraft was flown by its owner, who occupied the left front seat. An acquaintance sat on a temporary seat at the very front of the passenger cabin and the acquaintance's child sat in the front right seat. ZK-KAY was fitted with strobe lights on each wingtip, and equipped with a Mode C transponder. At the beginning of the flight the pilot switched the transponder ON (Mode C) and selected the conspicuity code (7000).

Approaching the Manchester Control Zone, the pilot established radio contact with the Manchester approach controller. The pilot did not ask for, nor was he offered, a radar service. Nonetheless, the controller observed a secondary radar return which he believed to be ZK-KAY and he kept a mental note of its position as it tracked towards his airspace.

After flying down the Manchester Low Level Route, the pilot climbed to 2,000 ft and turned towards the destination; the aircraft's speed was approximately 160 kt. A short while later, the controller observed that the aircraft was now outside his area of responsibility, and suggested to the pilot that he might like to change frequency to another ATC unit. The pilot informed the controller that he wished to remain on the Manchester frequency for a little longer.

As the aircraft neared Blithfield Reservoir, the pilot glanced down at his map, and then heard a 'thud'. Thinking that his engine had failed, he immediately banked the aircraft to the left to look for a landing site. Having turned, he saw burning wreckage on the ground, and concluded that there may have been a collision. He examined the engine instruments, which all showed normal readings. He transmitted a 'MAYDAY' call to Manchester approach.

The pilot was aware that he was only a short distance west of Tatenhill aerodrome. He set course for Tatenhill, established communication with the air/ground radio operator and stated that he wished to land. As the aircraft flew towards Tatenhill, the pilot briefed his passengers for an emergency landing and evacuation.

The pilot established the aircraft on the approach, but the air/ground radio operator observed that the aircraft's left main landing gear was absent, and informed the pilot of this. The pilot broke off his approach and diverted to East Midlands Airport, where he believed the fire and rescue facilities better suited an emergency landing.

The pilot contacted ATC at East Midlands and informed them of his situation. The aircraft was identified on radar and then directed to the final approach for Runway 09. The Aerodrome Fire and Rescue Service (AFRS) were deployed for the aircraft's emergency landing. The aircraft touched down normally on its right and nose landing gear, and the pilot endeavoured to prevent it settling onto its left wingtip for as long as possible. When it did eventually settle, friction between the wingtip and runway surface caused the aircraft to yaw to the left. The aircraft came to a standstill, and all occupants vacated without injury. AFRS personnel observed a small fuel leak from the left wing fuel tank, and sprayed the aircraft with Aqueous film-forming foam (AFFF). There was no fire.

G-AKUI

This aircraft, a Luscombe 8E Silvaire, was owned by an individual who was not a pilot, but an engineer. He had purchased the aircraft some years previously, and had restored it to a very good condition. He had established an informal arrangement with the pilot (who had previously owned a similar aircraft) and the two often flew together in the aircraft. Passengers who had flown with the pilot commented that he was circumspect, and took care to look out in the direction of a turn before manoeuvring.

On the day of the accident, the owner and pilot went to the aircraft's base at Abbots Bromley, intending to have a short flight. They mentioned in conversation before departure that they did not intend to land away.

The aircraft was not fitted with a transponder. A GPS receiver, capable of recording the aircraft's flight, was on board but was destroyed in the accident. Therefore, no definite information exists as to the altitudes at which the aircraft was flown.

Radar information indicates that the aircraft took off from Abbots Bromley at about 1150 hrs. At 1155 hrs, the aircraft was flying on a southerly track in the vicinity of Blithfield Reservoir. Radar information shows that another aircraft, not ZK-KAY, with a relatively lower groundspeed and giving a smaller radar return, was flying on a north-westerly track, to the south-east of G-AKUI. Thus, the two aircraft were flying towards each other, until, more or less simultaneously, the other aircraft commenced a turn to the left, and G-AKUI commenced a turn to the right.

G-AKUI's turn continued until the aircraft was on a roughly easterly heading; the other aircraft had continued its left turn during this time. G-AKUI and ZK-KAY then collided. In the collision, the left wing of G-AKUI was substantially damaged, and the aircraft was rendered incapable of further flight. The aircraft, missing some pieces of the left wing, fell to the ground and caught fire. The impact with the ground was not survivable. Fragments of the left wing structure and covering fell to the ground to the west of the main wreckage site.

History of the flight – the third aircraft

Further examination of radar data, and investigation at local airfields, identified the third aircraft. It was found to be a microlight, which was on an instructional flight from its base in the Lichfield area. Both the instructor and student were interviewed; they had been on a flight during which the instructor was teaching the student to conduct turning manoeuvres.

As the aircraft neared Blithfield Reservoir it had climbed to approximately 1,800 ft. Both on board remembered flying near the reservoir but neither had seen any other aircraft during the flight.

Recorded flight data

Neither of the aircraft involved in the collision were required to be equipped with a flight recorder. ZK-KAY was equipped with GPS navigation equipment, but this equipment was not capable of recording track data. The GPS device on board G-AKUI was capable of recording track data, but was destroyed in the fire. The third aircraft was equipped with a handheld GPS device capable of recording track data, but this was not switched on during the flight.

Investigation by NATS (the provider of enroute air navigation services in the UK) showed that the collision was not recorded by any of the NATS enroute radars. However, AAIB investigation identified that a radar

'feed', provided commercially by Birmingham ATC to a third party, was recorded. The quality of the recording was adequate for some analysis of the collision and is shown as Figure 1.

Figure 1

Images of radar recording at 24 second intervals

The Birmingham radar recording showed all three aircraft involved, until the time of the collision. At the moment of collision the radar returns of ZK-KAY and G-AKUI merged, and after this moment only the primary return of ZK-KAY was recorded (the SSR antenna on ZK-KAY was broken off in the collision, and SSR transmissions from the aircraft ceased).

Figure 1 shows images of the radar recording at intervals of 24 seconds, immediately prior to and including the collision; the time is shown in the bottom left corner of each image. Figure 2 shows an overview of the collision and debris field, relative to ground features.

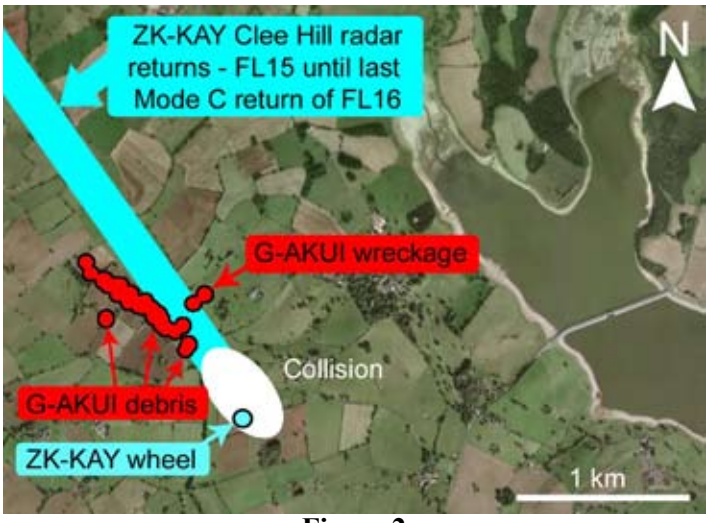

Figure 2

Collision overview

(Note: Radar FL figures are QNH corrected)

Google Earth ™ mapping service / Image © 2008 Infoterra Ltd & Bluesky

Aircraft information

Luscombe Silvaire 8E, G-AKUI (Figure 3)

G-AKUI was a single-engine, two-seat monoplane with a tailwheel landing gear and a high wing; it was manufactured in 1947. The aircraft was of all metal construction, with the exception of the wings which comprised a metal structure covered with fabric.

G-AKUI was predominantly medium blue in colour with silver markings, and was equipped with a white anti-collision beacon mounted on the top of the fuselage. The windows comprised a wrap-around front windscreen, a side window in each cabin door, a small rear quarter window on each side and a rectangular skylight window in the cabin roof. It was known to be carrying a radio, but was not believed to be equipped with an ATC transponder.

The aircraft held a current Permit to Fly, valid until 30 March 2008.

Figure 3

Luscombe Silvaire 8E, G-AKUI

Pacific Aerospace Limited PAC 750XL, ZK-KAY (Figure 4)

ZK-KAY was an all-metal, low-wing utility aircraft with a fixed tricycle landing gear. This type of aircraft is powered by a single 750 horsepower PT6A-34 turboshaft engine mounted in the nose, driving a 106-inch diameter, three-bladed, constant-speed propeller. Air is supplied to the engine via a chin-mounted intake duct and a fibreglass oil cooler outlet duct is mounted immediately behind the nose landing gear. ZK-KAY was configured for skydiving operation and as such was equipped with only two seats; one on the left side of the cockpit for the pilot and another on the right side for a front passenger. The windows comprised a wrap-around windscreen, a single large window on each side of the cockpit and several windows along the length of the cabin.

Figure 4

Pacific Aerospace Corporation PAC 750XL, ZK-KA

The fuselage was predominantly dark blue with yellow stripes and the wings were yellow with dark blue stripes. The aircraft was equipped with a radio and an ATC transponder, the antenna for the latter being mounted on the belly of the fuselage. The external lighting included navigation and anti-collision strobe lights mounted on each wingtip and a forward facing landing light located in the outer leading edge of each wing.

The aircraft had a valid, non-terminating Certificate of Airworthiness, issued by the Civil Aviation Authority of New Zealand on 8 June 2004.

Aircraft wreckage

G-AKUI

G-AKUI crashed on farmland approximately 2.5 miles north of Rugeley and one mile west of Blithfield Reservoir in Staffordshire. At the point of impact the aircraft was travelling at high speed, in a steep nose-down attitude and yawed slightly nose to the right. The forward fuselage and cabin area were largely destroyed by the impact and post-crash fire. The outer 9 feet of the left wing could not be accounted for at the crash site.

ZK-KAY

ZK-KAY exhibited several areas of obvious collision-related damage.

One of the propeller blades was missing the tip, and chordwise blue paint transfer marks and leading edge impact damage were present on the outer two-thirds of the blade span. A section of one of the internal bracing rods from G-AKUI's left wing was wrapped around the

blade.

Scrape marks and paint transfer from G-AKUI were visible on the lower surface of the chin intake and along the lower right side of the fuselage, stopping short of the wing (Figure 5). The marks were angled approximately 30° to the aircraft's longitudinal axis.

The ATC transponder antenna and oil cooler outlet duct were missing and a 16 inch longitudinal gash was visible in the fuselage belly skin aft of the nose gear.

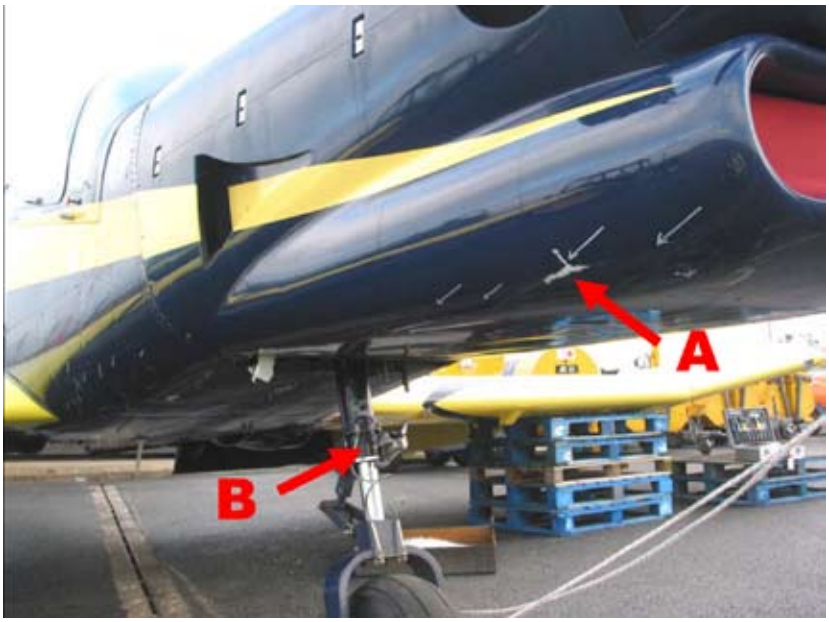

Figure 5

ZK-KAY nose view

Showing scrape marks (A) and nose gear shimmy damper damage (B)

Impact damage and deformation was visible on the nose gear strut and shimmy damper mechanism. The direction of the deformation was consistent with impact forces acting from right to left and front to rear relative to ZK-KAY's direction of travel. The entire left landing gear was missing, having been forcibly detached from its mountings.

The leading edge of the left wing was punctured immediately outboard of the leading edge root fairing, causing a minor fuel leak from the integral fuel tank.

Collision debris

A search of the surrounding countryside revealed numerous fragments of wreckage distributed over a ½ mile trail running from northwest to southeast, the centre of which was located approximately ¼ mile to the west of the crash site of G-AKUI, shown in Figure 2. The debris consisted of parts of G-AKUI's left outer wing and included the wingtip, pieces of wing structure, fabric and large fragments of the left aileron, one of which had a piece of ZK-KAY's oil cooler duct trapped in it.

One piece of wing leading edge fabric was found with an impression of a tyre tread on it, with accompanying rubber transfer on the fabric outer surface.

ZK-KAY's left landing gear was found approximately ⅓ mile beyond the southern end of the G-AKUI debris field, on the extended axis of the wreckage trail. Scrape marks and blue paint transfer were visible on the lower part of the landing gear and on the brake unit.

Engineering analysis

Collision parameters

The left wing of G-AKUI was reconstructed (Figure 6) to enable the pattern of damage to be compared with that of ZK-KAY, in order to deduce the dynamics of the collision.

The position and pattern of the scrape marks on ZK-KAY's chin intake and fuselage indicated that

G-AKUI approached from ZK-KAY's right side and that the outer 9 feet of its left wing was in collision with the lower right side of ZK-KAY's fuselage, with G-AKUI in an approximately wings-level attitude and slightly below ZK-KAY. G-AKUI's precise pitch attitude could not be determined, but it was not extreme. Assuming that ZK-KAY was travelling around twice the speed of G-AKUI, the direction of the scrape marks suggests that G-AKUI was tracking approximately at right angles to ZK-KAY at the point of collision.

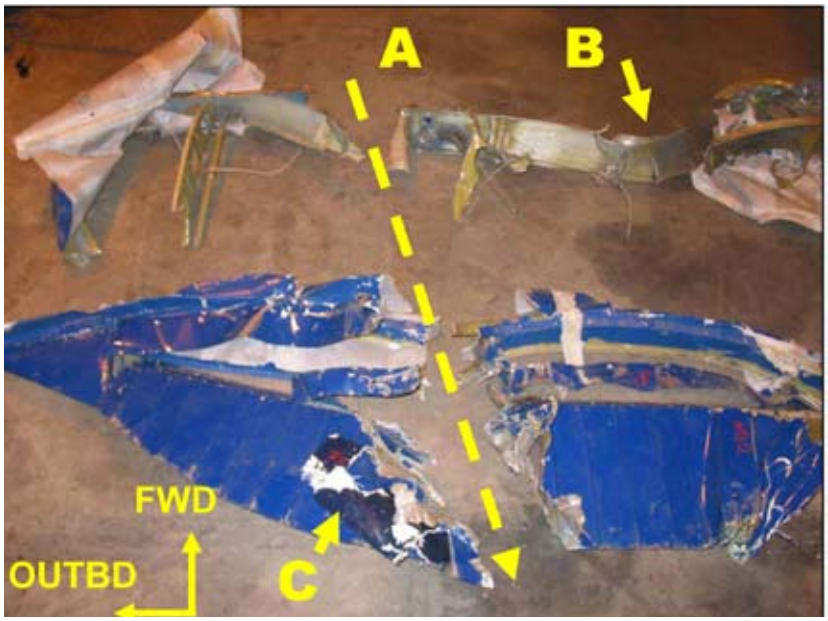

Figure 6

G-AKUI left outer wing

Showing damage caused by ZK-KAY nose gear (A), left main gear (B) and fragment of ZK-KAY oil cooler duct trapped in aileron (C)

The patterns and locations of the damage observed on both aircraft are consistent with G-AKUI's left wing having been in contact with ZK-KAY's propeller blade and nose landing gear. G-AKUI passed under ZK-KAY with the latter's nose gear cutting a swathe of damage through the outer part of G-AKUI's left wing, transecting the aileron and causing ZK-KAY's oil cooler duct to be torn off, a part of which became trapped in the aileron (Figure 6).

The impact between G-AKUI's left wing and ZK-KAY's nose gear caused G-AKUI to yaw to the left so that the flight paths of the two aircraft became more parallel. ZK-KAY's left tyre then struck the leading edge of G-AKUI's left wing slightly inboard of the first swathe of damage, causing ZK-KAY's left landing gear to be torn from its mounts and inflicting further, significant damage to G-AKUI's wing. Structural items from this area of the wing were found, with deformation matching the curvature of ZK-KAY's tyre. The piece of wing fabric with the tyre impression was also identified as being from this area. The longitudinal gash in ZK-KAY's fuselage belly skin and the puncture in the left wing leading edge were consistent with contact with the disrupted structure of G-AKUI's left wing.

It is probable that the damage sustained by the left wing of G-AKUI would have rendered this aircraft uncontrollable.

Visibility from the pilot's position

AAIB investigators took photographs from the forward end of the passenger cabin in ZK-KAY (Figure 7), and the approximate pilot's eye position in an aircraft similar to G-AKUI (Figure 8).

Eyewitness information

No eyewitnesses saw the collision take place. One person saw the wreckage of G-AKUI falling to the ground, whilst others saw ZK-KAY in flight after the collision had taken place.

Figure 7

View from cabin of ZK-KAY

Note - view from the pilot's eye position (left and lower) is compromised by the windscreen strut and engine cowling

Figure 8

View from pilot's position in an aircraft similar to G-AKUI.

Note - the view left and above is compromised by the aircraft wing, door pillar, and strut. G-AKUI was not fitted with the semi-transparent sun blind

Limitations of lookout

The AAIB investigation into a collision between a Cessna 152 aircraft and an Aerotechnik Eurostar on 18 December 2005[1] examined visual flight, collision avoidance, and lookout, in some detail. It noted that:

> *'there are limitations in the human visual system that serve to make collision avoidance difficult by visual means alone.'*

and that:

> *'small targets may be hidden behind aircraft structure, such as the engine cowlings, canopy arches, wings, or struts, until very late.'*

For these reasons some pilots use special techniques with the aim of improving their lookout. When interviewed, the pilot of ZK-KAY stated that he had not been taught a particular lookout technique.

A pilot who perceives an urgent need to avoid a collision with another aircraft is likely to manoeuvre his aircraft solely to avoid the immediate threat and is unlikely to carry out a specific lookout in his intended direction of turn. The probability of encountering another aircraft during avoiding action is, generally, slight.

Meteorological information

An aftercast from the Met Office indicated that the weather conditions across the UK were influenced by a large area of high pressure centred over Denmark. The resultant airflow was a south easterly polar continental air mass across the United Kingdom and the accident site. A marked inversion trapped a layer of sub-zero stratocumulus cloud across the greater area over and around the accident site. It was estimated that there were 7 or 8 oktas of stratocumulus cloud at the accident site with a base between 2,000 and 2,500 ft. Surface visibility was estimated to be between 7 and 10 km.

Footnote

[1] AAIB Bulletin 11/2006, EW/C2005/12/01.

A number of pilots who were airborne in the area at the time of the accident, or shortly afterwards, were interviewed. Most gave accounts of visibility ranging from 7 to 10 km, and all spoke of cloudbase somewhat above 2,000 ft. Only one spoke of a difference between the visibility 'into-sun' and 'down-sun', stating that 'into-sun' the in flight visibility was as little as 3 km, and 'down-sun it was about 7 km.

Medical and pathological information

The pilot of ZK-KAY was tested for alcohol after the accident; the test was negative. Otherwise, he was not medically examined.

The pathology reports on the pilot and passenger of G-AKUI did not reveal any abnormalities.

Rules of the Air

The Rules of the Air Regulations require aircraft in VFR flight at more than 140 kt, below 3,000 ft amsl, in Class G airspace, to remain clear of cloud, in sight of the surface, and in a flight visibility of at least 5 km.

It is possible (discussed in Analysis, below) that the occupants of G-AKUI spotted the '3rd aircraft' identified in Figure 1. Regarding avoidance of collision, and in respect of powered aircraft, the Rules state:

> *'When two aircraft are approaching head-on or approximately so in the air and there is danger of collision, each shall alter its course to the right.'*

Radar services

The UK IAIP (International Aeronautical Information Publication) gives details of the Lower Airspace Radar Service (LARS), which makes a Radar Advisory Service or a Radar Information Service available to pilots flying up to and at FL95[2] in certain areas. Blithfield Reservoir is theoretically within the range of Shawbury LARS, but the service is not available at a weekend.

ATC at Birmingham do not promulgate the availability of a LARS, although, subject to workload, the controllers there will endeavour to provide a service if a pilot requests it. Such provision will be the lowest of their ATC priorities, and the service may be limited, in accordance with the instructions published in the Manual of Air Traffic Services.

Visual conspicuity

The RAF Institute of Aviation Medicine published two unclassified reports on aircraft conspicuity[3]. The first examined the possible benefits of powerful forward-facing lights and the use of black paint on aircraft. The report concluded that both gave *'statistically significant advantages'* in terms of conspicuity, over aircraft without lights and those painted grey, respectively. The second report concluded that:

> *'Matt black paint schemes are in general more conspicuous than grey/green disruptive pattern[4], dark sea grey, and red, white and blue.'*

Another study[5] found that an aircraft with a black underside was more conspicuous than a white one, and that reflective tape applied to an aircraft's wings also aided conspicuity.

Footnote

[2] Military Middle Airspace Radar Service is available above FL95.

[3] IAM Report 723 *'A trial to assess aids to conspicuity'* and Report 747 *'Aircraft conspicuity and paint schemes'*.

[4] camouflage.

[5] Cranfield University *'Glider conspicuity trials held at RAF Bicester'*.

Electronic conspicuity and collision prevention

Electronic conspicuity involves the carriage and operation of devices such as transponders and 'FLARM' (a device developed initially for gliders). These devices make aircraft 'electronically conspicuous' to other aircraft which are equipped with the means of detection of, or interaction with, the equipment on the subject aircraft. These systems require electric power and the fitting of wiring and antennae, which demand spare capacity from the aircraft's power sources; they also add weight to the aircraft.

Aircraft owners may fit equipment such as TCAS, transponder proximity receivers, and FLARM, which assist their pilots in gaining awareness of other aircraft around them, and, in the case of TCAS, provide guidance to assist in avoiding collisions. Some lightweight devices are available, including some which carry their own battery power supplies.

TCAS is in very limited use in recreational aircraft, transponder proximity receivers are used by a small number of pilots, and FLARM, although gaining popularity amongst glider pilots, is finding less widespread acceptance outside gliding. It is widely accepted that the introduction of TCAS in commercial air transport aircraft has markedly reduced the probability of collision involving a TCAS-equipped aircraft and another transponding aircraft.

Mode S transponders and mandatory carriage

Following a previous mid-air collision, a CAA working group reviewed the recent history of mid-air collisions between recreational aircraft. The review determined that UK-registered aircraft had been involved in a total of 30 mid-air collisions in the period 1995 to 2004, resulting in 27 fatalities from 14 fatal accidents. Thus, collisions averaged three per year, and roughly half of the collisions involve at least one fatality.

Following the accident to G-AKUI and ZK-KAY, AAIB investigators discussed mid-air collisions involving recreational aircraft, and electronic conspicuity, with staff at the CAA's Directorate of Airspace Policy. The Directorate staff explained that, although they perceived a widespread concern about mid-air collisions amongst participants in recreational aviation, they were also aware of strong opposition from aircraft owners to mandatory requirements to fit transponders, on the grounds of complexity, cost, and weight. For these reasons, proposals to mandate widespread carriage of Mode S transponders had been withdrawn, and more limited proposals had been put forward for consultation. These proposals did not amount to an effort to reduce the collision risk between recreational aircraft, but only to protect aircraft operating inside controlled airspace from collision with recreational aircraft. The consultation was still under way at the time of this report's publication.

Any airborne collision avoidance system will only be effective provided that virtually all aircraft carry the necessary equipment. While few aircraft do so, there is relatively little benefit to those aircraft owners who do choose to fit it.

Analysis

Until the collision, the flights of both ZK-KAY and G-AKUI were unremarkable. The aircraft were airworthy, the pilots qualified and experienced, and the weather was appropriate for the flights. In particular, it is clear that the weather conditions satisfied the relevant legal requirements for VFR flight.

The radar data showed that the collision occurred

whilst ZK-KAY was in straight and level flight, but very soon after G-AKUI had completed a turn to the right. The turn executed by G-AKUI's pilot may have been carried out in the normal course of his flight, not prompted by any particular cause. However, radar evidence showed that this turn began as G-AKUI flew towards the third aircraft at short, and decreasing, range. The absence of information about the altitude at which G-AKUI began the turn is unhelpful. The collision occurred at approximately 2,000 ft, and the third aircraft's crew reported that it was at 1,800 ft in the area where the collision occurred. It is possible that G-AKUI was at about 1,800 ft, and its pilot saw the third aircraft coming towards him and decided to take action to avoid it. In these circumstances, a turn to the right would have been the correct action. The fact that the third aircraft then turned to the left, effectively increasing the duration of its encounter with G-AKUI, could explain the relatively tight nature of the turn by the pilot of G-AKUI, and the fact that it continued through perhaps as much as 300°.

When a pilot takes avoiding action, he is less likely than normal to look out prior to manoeuvring his aircraft. In this circumstance, his priority lies in avoiding a seen 'threat', and the presumption, at least in the short term, that no other 'threat' exists in the direction of the turn, is normal.

The dynamic situation in which the two aircraft collided may also have been critical: G-AKUI was to the right of ZK-KAY's path, and thus less visible to the pilot of ZK-KAY than if it had been to the left. In particular, if G-AKUI was climbing slightly following an encounter with the third aircraft at about 1,800 ft, this would place G-AKUI below and to the right of the nose of ZK-KAY, probably obscured by ZK-KAY's engine cowling. In a high-wing aircraft such as G-AKUI, lookout in the direction of any turn is impeded severely by the aircraft structure.

The collision occurred as the pilot of ZK-KAY glanced at his map, a natural part of the navigation task. There is insufficient evidence to determine whether this was a contributory factor in this accident.

Studies have shown that dark coloured aircraft are more conspicuous than light coloured ones. Both aircraft involved were relatively dark in predominant colour, although the areas of yellow paint on ZK-KAY may have had the effect of breaking up the areas of dark blue paint, and reducing the benefit of the darker colour scheme. It is probable that both aircraft were more visually conspicuous than white aircraft, which are considerably more common.

It is possible that collision might have been avoided by ATC intervention, as all three aircraft were visible, on radar, at Birmingham. However, Birmingham ATC is not normally able to provide a LARS, and it is understandable that pilots do not routinely request a radar service from them.

In summary, technology would appear to offer a robust means of reducing the risk of mid-air collisions, but this depends upon the widespread fitting of airborne devices. Proposals for mandatory carriage of Mode S transponders[6] outside controlled airspace met with widespread opposition from the recreational flying community; the CAA has withdrawn those proposals and no Safety Recommendation is made in this regard.

Footnote

[6] Summary of Responses Document for the Consultation on a proposal to amend of The Air Navigation Order 2005 For The Purpose Of Improving The Technical Interoperability Of All Aircraft in UK Airspace (http://www.caa.co.uk/docs/810/Summary%20of%20Responses%20Document.pdf)