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(ALL TIMES IN THIS BULLETIN ARE UTC)

ACCIDENT

Aircraft Type and Registration:	Boeing 737-8AS, EI-DCN
No & Type of Engines:	2 CFM 56-7B26 turbofan engines
Year of Manufacture:	2004
Date & Time (UTC):	6 November 2010 at 2028 hrs
Location:	Liverpool International Airport, Merseyside
Type of Flight:	Commercial Air Transport (Passenger)
Persons on Board:	Crew - 6 Passengers - 139
Injuries:	Crew - None Passengers - None
Nature of Damage:	Minor damage to left horizontal stabiliser tip cap
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	37 years
Commander's Flying Experience:	6,149 hours (of which 1,918 were on type) Last 90 days - 240 hours Last 28 days - 70 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional enquiries by the AAIB

Synopsis

The aircraft's horizontal stabiliser hit a lighting stanchion at the rear of the stand onto which it was being pushed. The stand was too small for the aircraft, and the required procedures were not followed.

History of the flight

The aircraft was scheduled to fly from Liverpool International Airport, Merseyside to Dublin International Airport, Ireland. ATC cleared the aircraft to push back from Stand 3 onto Stand 33, directly behind the aircraft, due to airport congestion. The pushback crew consisted of a tug driver and a headset operator who was positioned to the right of the aircraft's nose during the pushback. An Airside Safety Officer (ASO) was also present at the rear of Stand 33.

Just before the pushback was completed ATC informed the pilots that the aircraft had hit a lighting stanchion at the rear of Stand 33. The aircraft was towed back onto Stand 3 where it was inspected by an engineer and found to have sustained minor damage to its left horizontal stabilizer. The passengers were transferred to another aircraft.

Airport information

Airport Operational Instruction (AOI) 13 - *Apron Control and Marshalling Procedures*, stated the following in relation to daytime operating procedures:

'

*'**Stands 33 to 37***	*Stands 33 to 37 are similar to Stands 2-10 and can accommodate all Code C aircraft except those longer than 34m.'*

There are no separate night-time procedures. The Boeing 737–800 is 39.48 m long.

The AOI also stated that all stands are designed for taxi-in pushback operations; it is not intended that aircraft should be pushed back into these stands.

Airside Safety Officer's comments

The ASO stated that she received a call from ATC asking if EI-DCN could push from Stand 3 and hold on Stand 33. She approved this and went to inspect Stand 33 before parking her vehicle on an adjacent stand to control the flow of airside traffic driving behind the positioning aircraft. She was not expecting the pushback crew to attempt to position the tug and the aircraft onto Stand 33.

The ASO added that when the aircraft started its pushback she monitored the road and, as the tail of the aircraft approached the rear of Stand 33, looked for a 'banksman'[1] but could not see one. The aircraft then collided with the lighting stanchion at the rear of the stand. She requested ATC, by radio, to stop the pushback and, having attracted the attention of the tug driver, signalled for him to stop. She then approached the ground crew to inform them that the aircraft had hit the lighting stanchion.

ATCO's comments

The ATCO commented that he was not aware of the limitations on the use of Stand 33 published in AOI 13. He decided to give clearance for EI-DCN to perform a pushback to Stand 33 due to congestion on the apron. He added that as the ASO had approved the pushback and was present he assumed it was an appropriate clearance to issue, noting that he had issued such a clearance in the past without incident. He did not require the aircraft to be parked on the stand, but to be pushed back far enough to clear the taxiway.

Pushback crew's comments

The headset operator commented that he was unaware of the requirement for a banksman to be present. The tug driver stated that he believed the ASO was acting as a banksman. During the pushback he had concentrated on guiding the aircraft along the centreline and watching the headset operator.

Liverpool International Airport's comments

Liverpool International Airport commented that it was not common practice to pushback aircraft to a remote stand and that it was done on this occasion to facilitate ground movements. They added that the controller acted within the procedures which allow aircraft to pushback onto vacant remote stands. The procedure required the presence of a banksman for such a manoeuvre, but one was not provided on this occasion. The pushback crew attempted to push the aircraft back onto the stand, and clear the taxiway and rear-of-stand roadway with both aircraft and tug. However, the tug and aircraft combination exceeded the depth of the stand by 5 m. Also factors were the position of the light stanchion within the stand and the fact that the aircraft was pushed in tail first.

Safety actions

Liverpool International Airport has suspended similar pushback instructions and will review AOI 13 with the intention of ensuring clarity and understanding.

Footnote

[1] Member of the marshalling team assigned to monitor the aircraft's wingtip or tail.

ACCIDENT

Aircraft Type and Registration:	Cessna 310R, G-BGTT
No & Type of Engines:	2 Continental Motors Corp IO-520-MB piston engines
Year of Manufacture:	1979
Date & Time (UTC):	1 February 2011 at 1243 hrs
Location:	Jersey Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Left engine, left flap, left aileron and left main fuel tank
Commander's Licence:	Private Pilot's Licence
Commander's Age:	68 years
Commander's Flying Experience:	2,116 hours (of which 2 were on type) Last 90 days - 29 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot; information and reports provided by Jersey ATC; photographs supplied by third party

Synopsis

The pilot experienced difficulties with radio communications during the flight and was forced to divert to Jersey due to poor weather at his intended destination of Guernsey. The left landing gear collapsed during the landing at Jersey. It was determined that the aircraft had been unused for an extended period prior to the flight and that the landing gear pivot bearings were lacking in lubrication.

History of the flight

The aircraft was on a positioning flight from Exeter to Guernsey. Exeter ATC lost radio contact with the aircraft whilst it was en route. The pilot subsequently contacted Jersey Zone. No transponder signal was being received from the aircraft and so it was identified using the turn method. As the weather at Guernsey was below the minima for Special VFR (SVFR) flight within that zone and for an ILS approach by the aircraft, Guernsey ATC gave the pilot weather information for Jersey and Alderney. A very recent TAF for Jersey, indicating deteriorating weather, was also provided. The pilot then requested a diversion to Jersey.

The pilot was given a SVFR clearance into the Channel Islands Control Zone and asked to confirm that he could operate IFR if required. He confirmed that he could. Control was handed to Jersey Approach when the aircraft was some 20 nm east north-east of Guernsey. The pilot was given vectors to remain clear of traffic on ILS approaches into Guernsey. He was asked to either advise when he had the island (Jersey) in sight, or to request vectors for an ILS approach. The pilot requested vectors when approximately 20 nm north north-east of Jersey. Thereafter, continuing problems occurred with radio communication and with the aircraft failing to track as expected when given headings by ATC. Jersey Approach then resorted to use of their emergency handset and improved two-way communication was established.

The pilot was instructed to fly at an altitude of 2,000 ft and to report when level. Following a further request by Jersey Approach, he confirmed that he was level at that altitude. Approach Control then co-ordinated with Tower Control to identify the aircraft on radar whilst it was positioning for the ILS at Jersey. Approach Control advised Tower Control that the pilot was having difficulty complying with heading instructions and with radio communications.

The aircraft became established on the ILS at 9 nm DME and at 8 nm the pilot was given the visibility and cloud base of 6,000 m and broken cloud at 1,400 ft respectively. He was then instructed to contact the Jersey Tower frequency. When the aircraft was at 6 nm, Approach Control called Tower Control to confirm that the pilot had successfully changed frequency. The aircraft was found to be still tuned to the Approach frequency and was again requested to change. The tower controller then reported that the aircraft transmissions could be heard, but no responses were being received. When Tower Control resorted to their emergency handset, successful communication was achieved.

The aircraft was cleared to land with a reported cloud base of 900 ft and horizontal visibility in excess of 1,500 m.

Both the pilot and observers in the control tower considered the subsequent touchdown to be smooth. The pilot reported, however, that as the weight settled onto the landing gear, the left gear green light extinguished, the red gear unsafe warning light came on and the gear warning horn sounded. The left gear then collapsed and the left propeller contacted the runway.

The pilot further reported that he closed the throttles and pulled back the mixture and propeller levers as the aircraft departed the left side of the runway. He then moved the fuel selectors to the 'OFF' position, selected all switches off and vacated the aircraft. Although a transmission was made to Jersey Tower, no response was received.

Subsequent analysis of RT recordings from the Jersey Tower confirmed that the final radio transmission was audible but that the tower controller was fully engaged in alerting the airport fire service of the incident and so did not hear the pilot's call.

It is understood that the normal transmission and receipt of signals on both Approach and Tower frequencies is from pairs of antennae positioned at different locations on the island. The emergency handsets both communicate only via antennae positioned on the control tower.

Engineering information

Examination of the damaged aircraft by a third party determined that extensive corrosion of landing gear components was present and there was no evidence of any recent lubrication of the pivot bearings within the landing gear mechanism.

The Airworthiness Review Certificate for the aircraft had expired on 14 June 2009. Following a period of idleness, the aircraft was issued with an EASA Permit to Fly, by the CAA, on 7 January 2011. The Permit was valid until 6 February 2011 and was for the purpose of positioning for major servicing.

SERIOUS INCIDENT

Aircraft Type and Registration:	Cessna 441 Conquest, G-USAR
No & Type of Engines:	2 Garrett AiResearch TPE 331-10N-513S turboprop engines
Year of Manufacture:	1985
Date & Time (UTC):	10 December 2010 at 1745 hrs
Location:	East Midlands Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	None
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	14,000 hours (of which 220 were on type) Last 90 days - 62 hours Last 28 days - 38 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The pilot planned to fly an ILS approach with the autopilot engaged. The aircraft was given radar vectors to intercept the final approach course and the pilot reported to ATC that he was established on the localiser. The ATC controller then noticed that the aircraft was flying erratically, deviating from the expected track and altitude. He instructed the pilot to turn onto a specific heading and to climb to 2,500 ft. The pilot followed the controller's instructions and subsequently accepted a second radar vectored ILS approach, which was flown successfully.

History of the flight

The aircraft flew from Zurich, Switzerland, to East Midlands Airport where Runway 27 was in use. The weather conditions at East Midlands were recorded as: surface wind from 260°M at 25 kt, overcast cloud at 600 ft aal, light rain, visibility 7 km, temperature 2°C and barometric pressure 1028 mb. Moderate turbulence and light icing were also reported. It was dark.

The aircraft was given radar vectors to intercept the final approach course. The pilot reported that he was flying with the autopilot engaged and maintaining the assigned heading. He noticed that he had inadvertently descended below the assigned altitude of 2,000 ft, to 1,800 ft. He disengaged the autopilot, in order to correct the height manually, but, while he was doing so, went through the localiser. He reported to ATC that he would re-establish on the approach. He then attempted to re-engage the autopilot and continue the approach but this was unsuccessful. The pilot again reverted to manual flight but became disorientated and the aircraft went through a series of erratic manoeuvres.

The aircraft was handed over from the radar controller to the aerodrome controller (ADC) at 7 DME. The ADC noticed on his Aerodrome Traffic Monitor (ATM) that the aircraft was deviating to the right of the localiser course. The pilot reported that he would re-establish on the localiser and the controller issued a clearance to continue the approach. The controller then observed that the aircraft was carrying out unusual manoeuvres and appeared to have entered an orbit at 6 DME. The controller asked the pilot whether he required radar vectors but the pilot decided to continue with the approach.

Several more exaggerated heading changes to the north and south of the final approach course were observed by the ADC, together with rapid altitude changes. The lowest indicated altitude seen by the controller was 1,100 ft (800 ft aal), at 5 DME. The aircraft was still not established on the localiser and the ADC instructed the pilot to fly a heading of 180°M and climb to an altitude of 2,500 ft. The pilot was able to comply with these instructions and was transferred back to the radar controller. A second, successful ILS approach was made.

Discussion

The pilot reported afterwards that, in hindsight, he should have gone around as soon as he identified a problem with the autopilot. He noted that, in transitioning several times from automatic to manual flight, he had become confused by the attitude presentation and disorientated. This aircraft was fitted with an attitude indicator with a 'sky pointer' presentation with which he was unfamiliar. He considered that if he had allowed himself sufficient time to settle into manual flight the problem would not have occurred.

In the event, the intervention by the ADC was timely and, despite having suffered a loss of control, the disorientated pilot was able recover and follow the ATC heading and climb instructions.

ACCIDENT

Aircraft Type and Registration:	1) Dassault Aviation Falcon 7X, N312P 2) Piper PA-34-200T Seneca II, G-BGFT
No & Type of Engines:	1) 3 P&W Canada PW307A turbofan engines 2) 2 Continental Motors Corp TSIO-360-EB piston engines
Year of Manufacture:	1) 2009 2) 1978
Date & Time (UTC):	24 March 2011 at 0805 hrs
Location:	Oxford (Kidlington) Airport
Type of Flight:	1) Private 2) N/A
Persons on Board:	1) Crew - 2 Passengers - 2 2) Crew - None Passengers - None
Injuries:	1) Crew - None Passengers - None 2) Crew - N/A Passengers - N/A
Nature of Damage:	1) Cosmetic damage to wingtip 2) Rudder damaged beyond repair
Commander's Licence:	1) Airline Transport Pilot's Licence 2) N/A
Commander's Age:	1) 59 years 2) N/A
Commander's Flying Experience:	1) 14,000 hours (of which 108 were on type) Last 90 days - 26 hours Last 28 days - 12 hours 2) N/A
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

A Dassault Falcon 7X made contact with a parked Piper Seneca while taxiing to a parking area. The Falcon 7X was on a designated taxiway but clearance for this size of aircraft was not assured and the Seneca aircraft was incorrectly parked.

History of the flight

The Dassault Falcon 7X landed at 0802 hrs on Runway 19 at Oxford Airport, following a flight from Chicago Midway Airport, USA. The commander followed ATC instructions to proceed on Taxiway A to the parking area. As the aircraft taxied on Taxiway A, alongside the apron, ATC advised the crew that they appeared to have made contact with a parked aircraft.

None of the four people on board had felt the collision and the Falcon 7X continued taxiing, and shut down on its allocated parking area.

After the Falcon 7X had parked, the commander inspected his aircraft for any signs of damage. There were some paint markings evident on the left winglet, transferred from the parked Piper Seneca, but there was no sign of further damage. At 0832 hrs, the Falcon 7X departed from Oxford, en-route to Paris le Bourget Airport. On arrival, it was inspected by a maintenance organisation, with approval for the aircraft type, and it was confirmed that there was no significant damage.

The Piper Seneca sustained damage to its rudder which, when assessed by maintenance personnel, was found to require replacement.

Discussion

The apron at Oxford Airport had two rows of designated stands for light aircraft parking. The stands were marked and it was evident that the Seneca was not parked in the correct place. It had been parked with its tail about 1.2 m (4 ft) closer to the taxiway than the aircraft parked on adjacent stands.

There are two available taxiways from Runway 01/19 at Oxford. Taxiway A leads from the end of Runway 19 back to the south side of the apron area: Taxiway B leads from the eastern end of intersecting Runway 11/29 to the north side of the apron. The commercial airport chart used by the crew included a warning note:

> *'Aircraft with a wingspan in excess of 49 ft/15 m should exercise caution on Taxiway B.'*

There was no caution concerning Taxiway A.

Taxiway A, marked by a yellow centreline, continues along the east side of the apron. At this point, it was not sufficiently wide to meet the requirements provided in Civil Aviation Publication (CAP) 168, *Licensing of Aerodromes*, for aircraft such as the Falcon 7X, which has a wingspan of 86 ft (26.21 m). ATC had the option of requesting assistance from the Airfield Rescue and Firefighting Service (RFFS) to make a visual check of wingtip clearance when larger aircraft were using the taxiway. This was not done on this occasion.

An apron reconfiguration programme was scheduled to take place at Oxford Airport in February 2011. Part of the work involved moving the light aircraft parking stands further to the west to increase the Taxiway A strip to 26.5 m, thereby enabling the safe passage of larger aircraft such as the Falcon 7X. However, at the time of the accident this work had not yet started.

After the incident Oxford Airport instigated the following interim safety actions:

- A notice to be issued to remind instructors, at the training organisation who use the apron parking stands of the importance of aircraft being parked correctly.
- ATC to require all larger aircraft to be routed to use Taxiway B.
- The apron reconfiguration programme to be started as a matter of urgency.

The apron configuration was completed in May 2011.

ACCIDENT

Aircraft Type and Registration:	CAP 10B, G-BLVK
No & Type of Engines:	1 Lycoming AEIO-360-B2F piston engine
Year of Manufacture:	1981
Date & Time (UTC):	3 April 2011 at 1315 hrs
Location:	Private strip, St Mellion, Cornwall
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Right wing damaged
Commander's Licence:	Private Pilot's Licence
Commander's Age:	74 years
Commander's Flying Experience:	2,900 hours (of which 1,500 were on type) Last 90 days - 9 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft landed approximately 150 m into a 470 m wet grass strip and was unable to stop in the remaining distance available. The aircraft was damaged when it collided with a fence at the end of the runway.

History of the flight

The pilot was intending to land on the 470 m grass strip Runway 33 at St Mellion, Cornwall. The pilot's aircraft was normally based on a short strip and the pilot was familiar with both the short field landing technique and the aircraft's performance. The weather conditions were generally good with the surface wind of 240º at 15 kt, but when the aircraft arrived at the airfield there were showers of rain in the vicinity, one of which had recently made the airstrip grass wet. The pilot elected to fly the approach a little faster than normal, to allow for any windshear from the nearby showers, and, when he flared, the aircraft floated and did not touch down until approximately 150 m into the strip. The pilot was unable to stop the aircraft in the remaining distance available and the aircraft collided with a fence post at the end of the runway, damaging the right wing. The pilot, who was uninjured, vacated the aircraft normally. There was no fire.

The pilot considers he should have waited until the showers had passed. Then he would have been able to land in the correct place.

Comment

The POH for the CAP 10b gives its declared landing roll as 360 m, The CAA Safety Sense Leaflet No 7, (‘*Aeroplane Performance*’) states:

> *‘When landing at places where the length is not generous make sure you touch down on, or very close to your aiming point. If you’ve misjudged it, make an early decision to go around if you have any doubts don’t float half way along the runway before deciding.’*

It also states, when referring to the ground roll required, that:

> *‘Very short wet grass with a firm subsoil will be slippery and can give a 60% distance increase.’*

ACCIDENT

Aircraft Type and Registration:	Cessna 152, G-BOIR
No & Type of Engines:	1 Lycoming O-235-L2C piston engine
Year of Manufacture:	1979
Date & Time (UTC):	5 April 2011 at 1220 hrs
Location:	Runway 23, Sleap Airfield, Shropshire
Type of Flight:	Training
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Nose leg collapsed, propeller strike and scuffing to underside of engine cowlings
Commander's Licence:	Student
Commander's Age:	50 years
Commander's Flying Experience:	22 hours (of which 22 were on type) Last 90 days - 21 hours Last 28 days - 6 hours
Information Source:	Aircraft Accident Report Form submitted by the student pilot and the instructor

After satisfactorily flying two circuits on Runway 23 with an instructor, the student pilot was released to continue with a solo circuit consolidation exercise. During the landing flare of the first circuit, the aircraft appeared to experience a gust of wind, which caused it to rise a few feet. The aircraft then contacted the runway nosewheel first and bounced, before touching down again on the nosewheel, causing the nose leg to collapse. The student pilot was uninjured and able to vacate the aircraft unaided. The wind was forecast to be from 220° at 15 kt with gusts to 25 kt. The actual wind at the time was reported to be from 220° at 18 kt. The student pilot reported that the wind had become noticeably stronger and gustier during his solo circuit.

ACCIDENT

Aircraft Type and Registration:	Cessna 152, G-BTGX	
No & Type of Engines:	1 Lycoming O-235-L2C piston engine	
Year of Manufacture:	1984	
Date & Time (UTC):	23 March 2011 at 1136 hrs	
Location:	Shoreham Airport, West Sussex	
Type of Flight:	Training	
Persons on Board:	Crew - 1	Passengers - None
Injuries:	Crew - None	Passengers - N/A
Nature of Damage:	Propeller, nosewheel	
Commander's Licence:	Student	
Commander's Age:	52 years	
Commander's Flying Experience:	80 hours (of which 10 were on type) Last 90 days - 8 hours Last 28 days - 2 hours	
Information Source:	Aircraft Accident Report Form submitted by the pilot	

The Student pilot was carrying out a landing at Shoreham as part of his qualifying cross-country. During the final approach, in benign weather conditions, the aircraft was slightly high so the pilot reduced power. He considered the flare to be normal but recalled a firm touchdown, which caused the aircraft to bounce. He attempted to correct the bounce but the aircraft impacted the ground heavily causing the nosewheel to collapse and the propeller to strike the runway. The pilot, who was wearing a lap and diagonal harness, escaped uninjured.

The pilot reported that had he applied full power after the bounce and gone around, the accident could have been avoided and that his decision to continue the landing was down to inexperience.

In his candid submission (included in this report for information purposes only), the pilot reported that, after the accident, he discovered that he had misinterpreted paperwork sent to him relating to his medical assessment and he was not actually in possession of a current medical certificate. Guidance material contained in LASORS (a CAA publication detailing essential licensing requirements) states that 'A student pilot must hold a valid Medical Certificate or Medical Declaration (as appropriate to licence sought) before he will be permitted to fly solo.

ACCIDENT

Aircraft Type and Registration:	Cirrus SR20, N470RD
No & Type of Engines:	1 x Teledyne Continental IO-360-ES piston engine
Year of Manufacture:	2006
Date & Time (UTC):	10 August 2010 at 1435 hrs
Location:	Countryside near Hornton, near Banbury, Oxfordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Aircraft damaged beyond economic repair
Commander's Licence:	Private Pilot's Licence
Commander's Age:	50 years
Commander's Flying Experience:	180 hours (of which 109 were on type) Last 90 days - 10 hours Last 28 days - 4 hours
Information Source:	AAIB Field Investigation

Synopsis

The aircraft adopted an unusual attitude while the pilot's attention was directed to the autopilot and GPS controls on the centre console. On recognising this unusual attitude, the pilot made a brief attempt to recover control before activating the aircraft's ballistic recovery system. The aircraft descended under the parachute and landed in open ground.

History of the flight

The pilot and passenger had flown in the aircraft from its base at Weston in Ireland to Turweston Aerodrome in Northamptonshire, intending to return on the same day. Prior to departure from Turweston, the pilot telephoned a number of aerodromes to obtain weather information. He discussed the weather conditions on his route with the Turweston aerodrome manager, who sourced a variety of meteorological information from the internet. The pilot concluded that the conditions were suitable for his intended flight. The aircraft was fuelled to full tanks, and the pilot carried out a pre-flight inspection. No defects were apparent, and he carried out pre-flight checks including removal of the split pin from the Ballistic Recovery System (BRS) activation handle and a test of the autopilot system before taxiing for departure.

The aircraft took off at 1428 hours. Staff on the airfield at Turweston at the time of departure estimated that the cloud base was then approximately 1,700 ft and said that, between passing showers, the visibility was

10 km or more. The pilot established the aircraft on track towards LIPCO[1], made contact with Birmingham Approach, and gave some details about his flight, including his intention to cruise at 4,500 ft. At 1436 hrs, the controller asked him to report his aircraft type. He made a broken transmission "AIRCRAFT TYPE IS A SIERRA ROMEO TWO ZERO AND WE'RE ACT…". The controller asked the pilot to continue to pass the information, to which the pilot replied "JUST PULLED THE 'CHUTE – WE'RE OK". A short time later the pilot transmitted "WE'RE DESCENDING OVER OPEN GROUND - UNDER PARACHUTE – WE INADVERTENTLY WENT IMC". The controller acknowledged this information, marked the aircraft's location on his radar display, and alerted the emergency services. There were no further communications between ATC and the aircraft.

The aircraft descended under the BRS parachute and impacted a tree on common ground near a village. The tree restricted the opening of the right side cabin door, but both occupants vacated the aircraft without difficulty using the left side door. Neither occupant sustained injury and there was no fire. Members of the public arrived at the aircraft and gave assistance to the pilot and passenger.

The pilot made a 999 call to the Police, during which he told the police operator that he had "LOST CONTROL". Fire and rescue service personnel dealt with a fuel leak from a ruptured fuel tank.

The pilot's recollections

The pilot and passenger returned to Ireland by public transport, and were interviewed first by investigators from the Irish government's Air Accident Investigation Unit, who assisted the AAIB in this investigation. The pilot was later interviewed by an AAIB investigator.

The pilot stated that having departed from Turweston, he engaged the autopilot in vertical speed and navigation modes. Approaching 3,000 ft, he decided that the weather ahead was not suitable to continue the flight. He stated that he selected the altitude hold mode of the autopilot and pre-selected the heading bug to command a turn of 90° from his course before turning his attention to the GPS screen to programme a return to Turweston. His attention was directed for a time to the autopilot and GPS controls on the centre console of the aircraft. He stated that there was then a "huge jolt" which caused his headset to fall from his head. He then found himself looking ahead "absolutely straight down" at the ground. He stated that he immediately checked the indicated airspeed, which was 120 kt, closed the throttle[2], and pulled the BRS activation handle. Later in the first interview he added that he had attempted to pitch the aircraft nose up before activating the parachute, but that the aircraft had not responded to his control input.

The pilot stated that he used one hand to pull the BRS handle, giving a firm, sustained, pull. He commented that the parachute deployed with a loud rustling sound and that it took longer to influence the aircraft's motion than he expected. He stated that the aircraft then descended under the parachute and that during the descent he saw that the aircraft was drifting towards a built-up area. Being aware of a previous event in the USA, during which the pilot of another Cirrus had used engine power to influence the aircraft's path during a parachute descent, he re-started the engine and

Footnote

[1] LIPCO is a reporting point on the FIR boundary over the Irish Sea south-east of Dublin.

Footnote

[2] Recorded information indicated that the engine was shut down or stopped at around this time.

attempted to steer the aircraft. He was not certain to what extent he was able to influence the aircraft's path. The aircraft then began to drift away from the built-up area and he shut the engine down again and switched off the aircraft's electrical system. The pilot said that the descent under parachute was "very gentle".

During the interviews with the pilot, he gave an account of events without mentioning having entered IMC. A copy of the RTF recording was played to the pilot during the second interview, and after listening to it he stated that he had not entered IMC but had made the transmission to indicate that he was turning because there was cloud ahead.

Pilot training

The pilot obtained a PPL(Aeroplanes) in 2007 and completed two days of Cirrus conversion training with a Cirrus certified instructor shortly after acquiring the aircraft. This training included use of the autopilot and associated systems, although the pilot acknowledged that he did not understand the operation of some autopilot selections. The pilot stated that he had no memory of a briefing on the BRS system, but that he had made himself very familiar with the system description in the aircraft documentation, and was aware of the maximum demonstrated deployment speed, which he stated was 132 kt[3]. He commented that he had developed the view that the parachute system was a "last resort". He had no qualification for flight in IMC.

Meteorological information

The Met Office supplied an analysis of the conditions in the area of Hornton, near the accident site, at the time of the event. From his study of satellite and radar images, the meteorologist concluded that Hornton lay on the boundary between an area of thick cloud cover to the south and more broken cloud with some clear areas to the north. His report stated:

'The location of Hornton is very close to the boundary between these two areas for much of the day, only becoming properly clear of the cloudier area in the south by the 1600 UTC frame. The nearest observation is from the METAR at Coventry airport (EGBE) which shows the cloud base lifting from 1100 UTC. However, given that the large mass of cloud moves only very slowly and erratically southwards through the day, Hornton is likely to have experienced lower cloud bases and poorer conditions later in to the day than Coventry (the satellite imagery shows the cloud to be more extensive over the Hornton area than the relatively short distance further north over Coventry). The rainfall radar also shows that Hornton was affected by rainfall on and off throughout the day, although it had cleared south by 1500 UTC. The implication of the rainfall is of a significant depth of cloud above the Hornton area.'

There are no official meteorological observation sites close to Hornton. However, an indication of the conditions may be obtained from reports from the nearest stations. See Table 1.

The chief flying instructor at Shennington Gliding Club, 2 nm south-west of the accident site, recalled that at about 1430 hrs, the gliding club had ceased flying[4] because low cloud, rain, and drizzle had moved into

Footnote

[3] The Pilot's operating handbook states *'The maximum demonstrated deployment speed is 135KIAS…'*.

Footnote

[4] The last landing before the reported poor weather was at 1410 hrs, the first launch afterwards was at 1520 hrs)

Station	Visibility and weather		Cloud	
	1420 hrs	1450 hrs	1420 hrs	1450 hrs
Birmingham	10 km or more	10 km or more	FEW 3,000 ft	FEW 3,000 ft
Coventry	10 km or more	10 km or more	SCT 2,500 ft	SCT 2,400 ft
Gloucester	10 km or more	10 km or more	BKN 1,500 ft BKN 3,000 ft	BKN 1,500 ft BKN 3,000 ft
Cranfield	8 km	4 km, Rain	FEW 1,800 ft SCT 2,600 ft	SCT 1,000 ft SCT 2,000 ft
Fairford	4,800 m, Slight Rain, Mist (1355 hrs)	6 km Slight Rain, Mist (1455 hrs)	FEW 500 ft OVC 2,200 ft	OVC 2,200 ft
Brize Norton	3,000 m, Rain (1350 hrs)	2,500 m, Rain	BKN 500 ft, OVC 2,000 ft	BKN 400 ft, OVC 1,000 ft

Table 1

Meterological information

the area. He estimated that the cloud base was 800 to 1,000 ft above the airfield, and visibility was perhaps 1,500 m. The sky cleared promptly, after 30 or 45 min of poor weather.

ATC and emergency services response

The controller working the Birmingham Approach frequency did not, at first, recognise that the pilot's transmissions regarding the parachute having been deployed referred to a BRS parachute. He quickly realised, however, that it was unlikely that the pilot would make a radio transmission whilst descending under a personal parachute, and his knowledge of the Cirrus aircraft assisted him in realising that the whole aircraft was descending by parachute.

The investigation identified that staff members of air navigation service providers have not been informed, in any formal way, of the development and introduction of ballistic recovery systems. Whilst many staff members are aware of the systems, and some know that they are fitted to a variety of aircraft including the Cirrus, others do not.

Recorded data

The aircraft was equipped with an Avidyne Entegra Primary Flight Display (PFD) and Multifunction Flight Display (MFD). These were removed from the aircraft and the data read out at the AAIB's laboratory. The version of the PFD software installed meant that parameters relating to the autopilot were not recorded.

Recording began as the aircraft taxied at Turweston and ended with the aircraft on the ground following the accident. The later part of the accident track, based on the GPS positions and recorded pressure altitude, is presented in Figure 1. Selected recorded flight parameters are plotted in Figure 2 for the whole of the accident flight. The accelerations, which were recorded from accelerometers within the PFD, were converted to units of 'g' and corrected to the aircraft's centre of gravity position before being plotted. The altitude bug

Figure 1

3D view of the latter part of the aircraft's track from GPS position and recorded pressure altitude

and heading bug values were recorded each time either of these parameters was changed during the flight.

Figure 2 shows that between 1430:30 hrs and 1434:30 hrs, the aircraft was climbing at a constant 400 ft/min on a heading of 295ºM. The recorded engine speed was 2,530 rpm and the indicated airspeed 120 kt, reducing to 115 kt. The aircraft then began to level off. 25 seconds later, at 1434:55 hrs, the aircraft reached 3,360 ft amsl and this altitude was selected on the altitude bug. During the next 75 seconds of flight the data is smoother than data recorded up to this point. The recorded data covering this portion of the flight is presented in more detail in Figure 3, which includes the

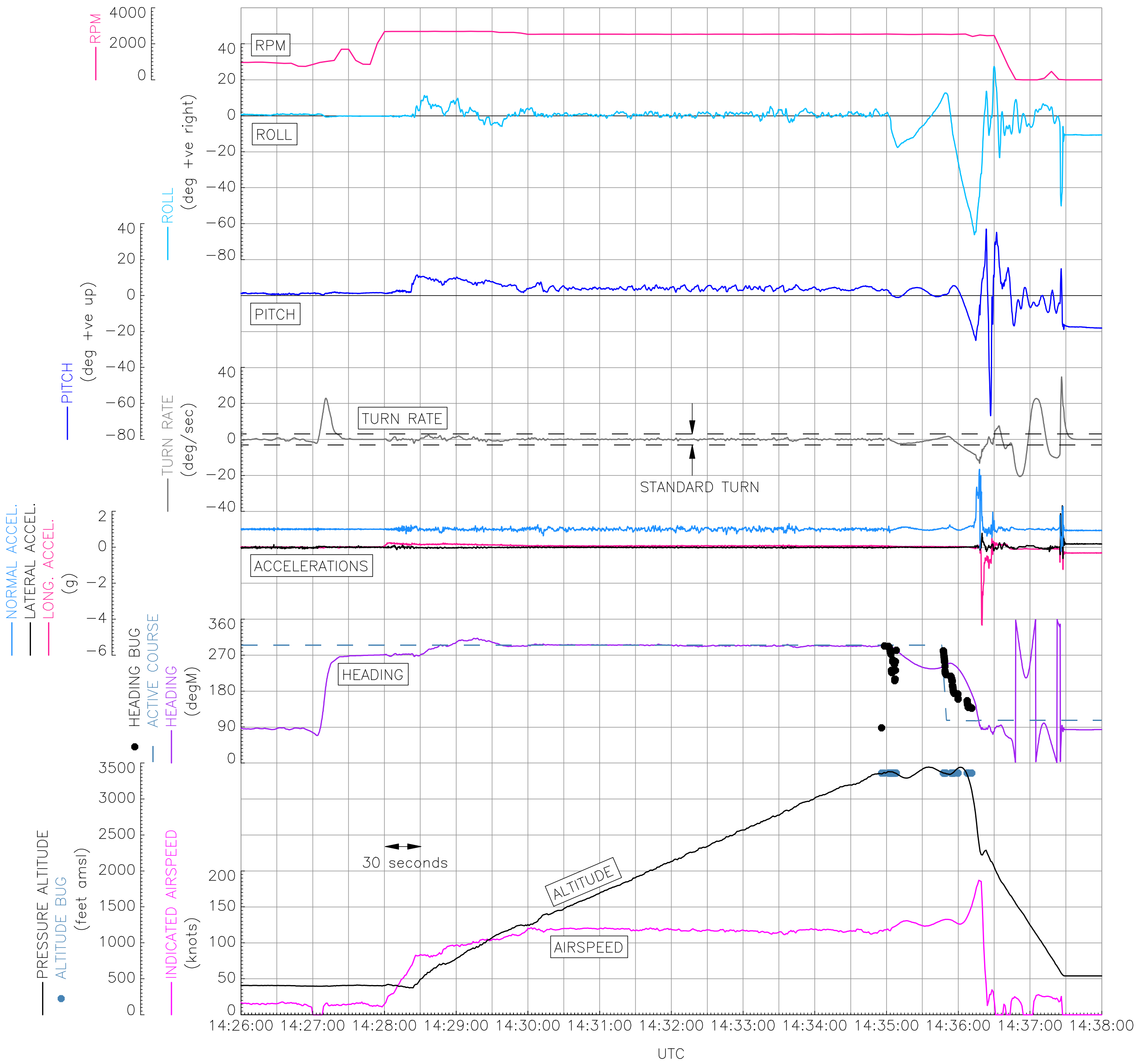

Figure 2

Salient recorded parameters from the PFD and MFD showing the whole flight

'active course bearing' from the recorded navigation data for the selected navigation source, and some of the radio calls between N470RD and Birmingham Approach.

Between times 1434:55 hrs and 1436:15 hrs, the aircraft's flight path and attitude were not stable. The altitude climbed gradually by about 50 ft while oscillating two and a half times through ±75 ft, with corresponding oscillations in pitch (±3º) and airspeed (± 5 kt and increasing by 10 kt). The roll was less oscillatory (and also not in phase with the pitch oscillations), initially rolling to 18º left wing down then to 13º right wing down, and then to the left again.

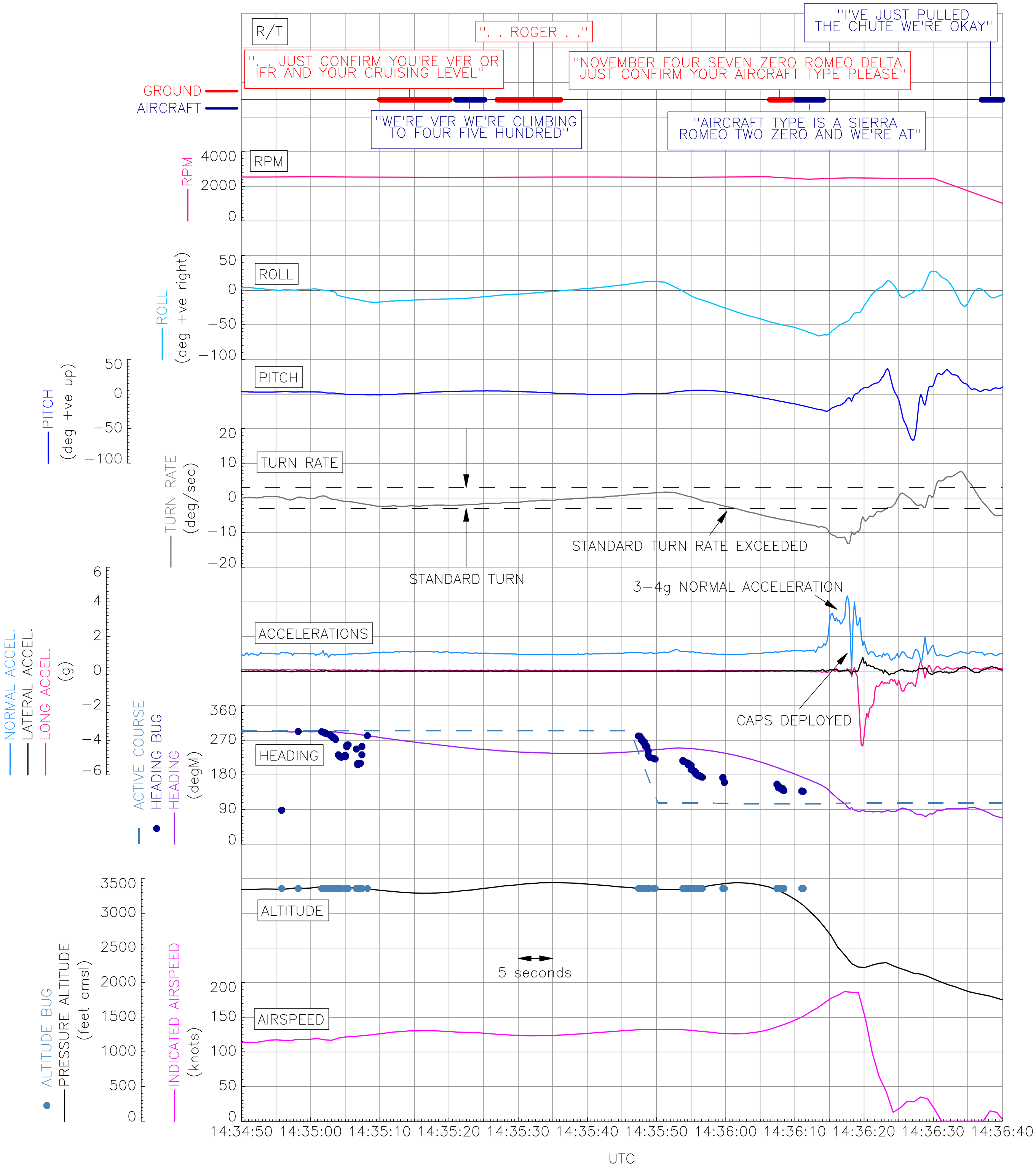

Figure 3

Salient recorded parameters from the PFD and MFD from top of climb to the CAPS deployment

A corresponding heading change can be seen as the aircraft initially turned to the left from 295ºM through 50º, at less than the standard turn rate of 3º/sec. As the aircraft started to turn there were a number of changes to the heading bug over a period of seven seconds. On reaching 235ºM in the left turn, the aircraft started a similarly gentle turn to the right through 15º during which the active course changed from 295ºM to 197ºM. The heading bug also changed in stages to 221ºM. The aircraft then started another turn to the left, during which the turn rate exceeded the standard value and continued to increase. A similar divergence was recorded in the aircraft's attitude as it banked left and pitched down, with increasing airspeed and loss in altitude. Further heading bug changes were recorded, to a final value of 137ºM.

At 1436:13 hrs, as the bank angle reached 66º left wing-down and the pitch 25º nose-down, there was a sharp rise in the normal acceleration from a nominal 1g to 3g, and then to 4g two seconds later, consistent with recovery from a developing spiral dive. A review of the recorded data made by the aircraft manufacturer confirmed that from 1436:17 hrs, the aircraft's flight profile and dynamics were consistent with the CAPS having being deployed. At the time of deployment (1436:17 hrs) the aircraft's altitude and airspeed were 2,400 ft amsl and 187 kt, respectively. The pitch attitude was 9º nose-down and aircraft was banked 45º to the left.

The recorded data provided no evidence of a significant jolt or abrupt change in the flight path prior to the moment at which the BRS was activated.

Accident site

The aircraft was substantially intact and was located at the foot of a large tree. Several branches were broken and there were areas of surface damage to the aircraft in which there were transfer marks from the bark of the tree. The tree had probably absorbed some of the energy of the descending aircraft.

The parachute was still attached to the aircraft. This was inspected and found to have several scorch marks that ran in a line on the parachute canopy. These marks were consistent with the canopy having contacted overhead electricity lines that were located nearby. Local residents reported a power cut at approximately the time the aircraft landed, which further supports this. There was some minor damage to the parachute that might have been caused by high forces. Early in the recovery operation the parachute was detached from the aircraft to ensure that it did not re-inflate, move or further damage the aircraft.

The PFD and MFD were removed so that flight data information could be extracted.

The cover panel of the Ballistic Recovery System, measuring 43 x 38 cm, was recovered from a nearby field. The words '*Warning! Rocket for parachute deployment inside stay clear when airplane occupied*', appeared in two places, in black letters on an adhesive sticker which measured 4 x 17 cm.

The aircraft was recovered to AAIB for further examination.

Aircraft information

N470RD was an SRV version of the SR20 aircraft. The aircraft was fitted with two large electronic flight display units: the PFD and MFD. The aircraft had two conventional instruments: an airspeed indicator and an altimeter. The aircraft was approved for flight under VFR only.

The aircraft was fitted with a ballistic recovery system, as standard for the type. This is an emergency parachute that is deployed from a compartment behind the cabin and is activated by pulling a handle in the cockpit. The maximum parachute deployment speed demonstrated by the manufacturer was 135 KIAS. Both successful and unsuccessful deployments have been recorded at speed in excess of 135 KIAS.

The aircraft was fitted with an S-TEK 55SR autopilot driving a roll trim servo and a pitch trim servo. Pilot inputs to the stick mounted trimmer button are also fed into the autopilot. The roll computer function of the autopilot receives signal input from the PFD and from the turn co-ordinator. The latter is a standard gyroscopic instrument mounted behind the instrument panel and is not visible to the pilot during flight.

The pitch computer function in the autopilot receives input from the altitude transducer (which receives input from the static pressure port), an accelerometer inside the autopilot unit, glideslope deviations and pilot input speed selections.

Aircraft manufacturer's analysis of the recorded data

The manufacturer analysed the recorded data and reported that in the minute or so prior to the BRS activation, the data showed that either the autopilot was not engaged, or it was engaged but was malfunctioning, or there was some other influence on the flying controls (possibly from pressure inadvertently applied by the pilot or passenger to the side control sticks).

Engineering investigation

The three primary flight controls were checked for continuity, and full and free movement. No anomalies were identified.

The autopilot system was ground tested with inputs to the altitude transducer, the turn co-ordinator, the accelerometer in the autopilot unit and the PFD. The autopilot was tested in various modes and the functioned normally.

The turn co-ordinator was tested at a specialist instrument facility and functioned normally.

Analysis

The background to the flight, preparation, and departure, all appear to have been unremarkable. The aircraft was apparently airworthy, and the pilot qualified. Whilst poor weather was reported not far from Turweston, there is no evidence that the pilot departed in inappropriate conditions.

As the aircraft climbed towards the pilot's intended cruising altitude of 4,500 ft, the pilot apparently decided to turn back towards Turweston, perhaps as he approached the poor weather which had caused the gliding club at Shennington to stop flying. He selected the altitude mode of the autopilot and attempted to command a turn back towards Turweston.

In doing so, the pilot adjusted the heading bug and programmed the GPS. During this time, the aircraft began a series of manoeuvres, slight at first but becoming more dynamic. The pilot's attention was directed towards the controls on the centre console of the aircraft, which might explain why he was not aware that the aircraft was not performing as he intended.

The cause of the subsequent manoeuvres could not be identified. The pilot reported that the autopilot was engaged at the time, but the aircraft manufacturer's analysis of the recorded data shows that it was either not engaged, was malfunctioning, or there was some interference with the controls.

The pilot recalled feeling a jolt and then looking up and seeing that the aircraft was pointed at the ground. Examination of the recorded data showed no evidence of a jolt prior to activation of the BRS, and the engineering investigation found no mechanism by which a jolt would have occurred.

The BRS was activated shortly after the aircraft reached an attitude 25° nose down and 66° left wing-down. The pilot's remarks are consistent with his realisation that the flight path was abnormal at that time. Recorded information shows that the aircraft's nose then pitched up with a 3 g and then a 4 g normal acceleration, which was probably the result of the pilot's attempt to recover the aircraft's attitude, as he mentioned when interviewed.

It was not possible to determine if the aircraft had entered IMC inadvertently, as the pilot reported initially.

The pilot recalled seeing an indicated airspeed of 120 kt before he pulled the BRS activation handle. Recorded data shows that it was 187 kt at the time. This speed is considerably in excess of the maximum demonstrated deployment speed stated by the manufacturer.

The engineering investigation identified no abnormalities in the aircraft or its systems. An intermittent or occasional malfunction of the autopilot could not be ruled out, although all tests indicated that the autopilot and associated systems functioned normally.

Discussion

Pilots using automatic flight devices must monitor those devices constantly to ensure correct functioning, and intervene promptly if abnormalities occur. Confusion about the active modes of such devices, and failures to recognise malfunctioning automation, have been reported as causal in several accidents.

Recorded data was useful in the investigation. Although it was unfortunate that some parameters, such as autopilot engagement and mode, were not recorded, recorders are not mandatory on this type of aircraft, so no Safety Recommendation is appropriate in this regard.

Safety action

In realising that the whole aircraft was descending under parachute the Birmingham Approach controller was guided by his personal knowledge of ballistic recovery systems, not any formal information or training. The absence of information or training for air navigation service providers' staff on ballistic recovery systems was discussed with the Civil Aviation Authority, and appropriate information will be published on the topic.

ACCIDENT

Aircraft Type and Registration:	Flight Design CT2K, G-CBAI
No & Type of Engines:	1 Rotax 912ULS piston engine
Year of Manufacture:	2001
Date & Time (UTC):	16 April 2011 at 1300 hrs
Location:	Kilkeel Airfield, Northern Ireland
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Left wing root and leading edge
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	53 years
Commander's Flying Experience:	141 hours (of which 36 were on type) Last 90 days - 10 hours Last 28 days - 5 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

Shortly after touchdown, the aircraft drifted to the left of the runway centreline. Although corrective aileron and right rudder were applied, the aircraft departed the runway and struck a wooden windsock pole. A subsequent check of the rudder and nosewheel steering mechanism did not identify any defects.

History of the flight

The aircraft is a monoplane with a tricycle undercarriage and nosewheel steering. Kilkeel Airfield has a single grass Runway 18/36 and, upon making an overhead join, the pilot estimated from the windsock that the wind was light to moderate from approximately 300° and positioned for a landing on Runway 36. Having descended to circuit height, Kilkeel radio advised that the wind was from 250° at 5 kt. The pilot confirmed this from the windsock and repositioned for a landing on Runway 18. Having confirmed that the crosswind component was within the aircraft's limits (maximum crosswind limit with flap 15° to 40° is 13 kt to 11 kt), the pilot continued his approach, configuring the aircraft for a flap 30° landing. On short final, the pilot considered that he was high and carried out a go-around.

Having positioned for a second approach, the aircraft was configured for a flap 40° landing and a approach speed of between 50 kt to 55 kt. Although touchdown on the mainwheels appeared normal, the aircraft started to drift to the left of the runway centreline. The pilot stated that the aircraft had a normal tendency to drift to the left during the hold off. He had applied corrective aileron and right pedal, but the controls felt as though they had "locked" and were not responding. The aircraft continued to drift to the left until it departed the runway and entered an area of long grass. Whilst travelling at about 10 kt, the left wing struck a wooden windsock pole, which slewed the aircraft to the left and brought it to a halt. The pilot shut down the engine before he and his passenger, both uninjured, exited the aircraft. The left wing root and leading edge were damaged.

The pilot stated that he had found that this aircraft type had less rudder authority at low airspeeds and power settings compared to other microlights he had flown. However, he advised that he had not previously experienced problems controlling the aircraft after touchdown and that under the prevailing conditions he considered that he should have been able to maintain directional control. A subsequent check of the rudder and nosewheel steering mechanism identified that although slightly stiff in operation, full travel was available.

INCIDENT

Aircraft Type and Registration:	Jodel D92 Bebe, G-BDNT
No & Type of Engines:	1 Volkswagen 1600 piston engine
Year of Manufacture:	1957
Date & Time (UTC):	13 March 2011 at 1330 hrs
Location:	Oaklands Farm Strip, Oxfordshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Minor) Passengers - N/A
Nature of Damage:	Damage to landing gear
Commander's Licence:	Private Pilot's Licence
Commander's Age:	59 years
Commander's Flying Experience:	638 hours (of which none were on type) Last 90 days - 0 hours Last 28 days - 0 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The Jodel D92 is a single-seat, taildragger aircraft. The pilot was making his first flight on this aircraft type, having first completed a series of taxiing exercises. After familiarising himself with the in-flight handling characteristics of the aircraft, he entered the circuit and made a low approach and go-around. On the next circuit he made an approach to land. During the landing the left landing gear stuck a telegraph pole that had been laid horizontally to restrict access to the strip and which also marked the runway threshold. The pilot suspected that he might have allowed the airspeed to drop excessively during the approach. He sustained only a minor cut to his hand.

ACCIDENT

Aircraft Type and Registration:	Miles M65 Gemini 1A, G-AKHP
No & Type of Engines:	2 Blackburn Cirrus Minor II piston engines
Year of Manufacture:	1947
Date & Time (UTC):	27 December 2010 at 1530 hrs
Location:	North Coates Airfield, Lincolnshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to propellers, engine cowlings and flaps; engines shock-loaded
Commander's Licence:	Private Pilot's Licence
Commander's Age:	61 years
Commander's Flying Experience:	3,388 hours (of which 93 were on type) Last 90 days - 4 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The pilot did not select the landing gear down prior to touchdown. The aircraft settled on its engine cowlings and slid along the grass runway for a short distance before coming to rest.

History of the flight

The pilot had undertaken a local flight from the airstrip where the aircraft was based, returning some thirty minutes later after an uneventful flight. He carried out what he believed was a normal approach, but at touchdown the aircraft settled onto its underside and the pilot realised the landing gear was not down. The aircraft slid for a short distance along the grass runway before coming to a halt. The pilot, who was uninjured, made the aircraft safe before leaving the cockpit.

Additional information

The aircraft has a fixed tail wheel and retractable main landing gear whose maximum operating speed is 100 mph. Normally the main landing gear would take approximately 20 seconds to lower and its position when locked would be indicated by two landing gear position lights in the cockpit. The aircraft had a flap limiting speed of 75 mph and, prior to lowering them, the pilot would normally lower the landing gear during the approach to help decelerate the aircraft.

The pilot reported he did not use a written checklist as the checks were straightforward and he was familiar with the aircraft. An unusual braking system and lack of engine fuel mixture controls also meant the normal 'mixture, gear and brakes' final approach check he used on other types was not appropriate to this aircraft.

The pilot could think of no reason why he overlooked the landing gear during the approach. There had been no distractions and he was familiar with both the aircraft and the landing strip. The weather had been "good", with light wind and a 2,000 ft cloud base.

Comment

The pilot reported that normally he flew aircraft types with fixed landing gear. Equally, benign conditions and familiarity with an aircraft and surroundings can lead to unexpected errors. Either factor might have contributed to the pilot's oversight on this occasion. The pilot reported that he will make use of written checklists when the aircraft is returned to flying condition.

SERIOUS INCIDENT

Aircraft Type and Registration:	Piper PA-28-140 Cherokee, G-BCDJ
No & Type of Engines:	1 Lycoming O-320-E2A piston engine
Year of Manufacture:	1968
Date & Time (UTC):	13 January 2011 at 1038 hrs
Location:	Knighton Farm, Alcester, Worcestershire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage	Fire damage to fuselage and left wing, damage to a field boundary fence and crops
Commander's Licence:	Private Pilot's Licence
Commander's Age:	48 years
Commander's Flying Experience:	568 hours (of which 450 were on type) Last 90 days - 23 hours Last 28 days - 5 hours
Information Source:	AAIB Field Investigation

Synopsis

After approximately 20 minutes of normal flight, the pilot identified a significant fuel leak in the cockpit. He considered that he should land the aircraft as quickly as possible and selected a suitable field. During the ground roll and immediately after a collision with a wire fence, the fuel ignited but the pilot managed to evacuate the aircraft without injury. The source of the fuel leak was not identified.

History of the flight

The pilot departed Wellesbourne Airfield at around 1020 hrs for a local flight. After approximately 20 minutes of normal flight, the pilot moved his foot from the rudder pedal and heard a noise similar to the sound of stepping in a puddle. He reached down to the footwell and felt several millimetres of fluid, which smelt of fuel. The pilot considered that he should land the aircraft as quickly as possible and selected a suitable field. During the landing roll, the aircraft hit a wire fence, there was a simultaneous flash in the aircraft cabin and the fuel ignited. The pilot moved across the passenger seat, out of the door and then from the wing onto the ground. The aircraft continued to roll for a further 50 ft, before coming to rest. The interior of the aircraft continued to burn fiercely, until a halon fire extinguisher fitted within the cockpit exploded and extinguished the fire. The pilot was not injured.

Aircraft inspection

The owner recovered the aircraft, prior to it being brought to the AAIB for investigation. The aircraft interior, windows, and fuselage skin were extensively damaged by heat and smoke from the fire. Heat damage was also identified around the left wing root lower skin. Pictures taken immediately after the fire was extinguished show an area of burnt grass directly below this area, suggesting burning fuel had dripped from the low point of the wing root, causing the grass to ignite.

The pipes from the wing fuel tanks entered the aircraft cabin behind the front seats and ran forward along the lower part of the left fuselage wall to the fuel tank selector valve located on the fuselage wall forward of the left front seat. The engine delivery fuel pipe then ran from the selector valve, through a sealed cutout in the firewall, to the fuel filter and electric pump. The pipes had been cut immediately behind the pilot's seat during the removal of the wings to allow recovery of the aircraft from the field. The section of pipework from this cut to the firewall, including the selector valve, was removed from the fuselage and pressure tested. No leak was identified, though the pipes and valve had suffered significant heat damage.

Expert fire investigators conducted an assessment of the fuselage damage. They confirmed it was consistent with a heat source at low level within the cockpit area, most likely within the left front footwell and involving a fire that produced high temperature gases with unburnt products (soot). No damage was found forward of the engine firewall. A secondary fire caused the damage to the left wing root after the grass below it ignited.

Service bulletin

The aircraft manufacturer issued Service Bulletin No 717 in 1981, introducing an inspection for fretting of the fuel pipe near the fuel tank selector valve. Although the service bulletin was applicable to the accident aircraft serial number, no evidence of fretting was identified on the fuel pipe in this area.

Conclusion

The source of the fuel leak between the fuel tanks and the engine firewall could not be determined due to the post-accident damage. However, the leak rate was sufficient to result in a significant amount of fuel collecting in the left front footwell during the 20 minutes of aircraft operation prior to the precautionary landing. Likewise, the source of ignition could not be determined, though sparks from the collision with the fence or from electrical equipment on the aircraft were possible causes.

ACCIDENT

Aircraft Type and Registration:	Piper PA-28-161 Cherokee Warrior III, G-WARU
No & Type of Engines:	1 Lycoming O-320-D3G piston engine
Year of Manufacture:	1997
Date & Time (UTC):	11 April 2011 at 0952 hrs
Location:	Leicester Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to left wingtip of G-WARU; damage to windscreen and door pillar of parked Robinson R22 helicopter G-BTHI
Commander's Licence:	Private Pilot's Licence
Commander's Age:	61 years
Commander's Flying Experience:	110 hours (of which 110 were on type) Last 90 days - 16 hours Last 28 days - 4 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The Warrior was taxiing to a parking area when it encountered another aircraft taxiing towards it. The pilot of the Warrior turned left onto another taxiway which also led to the intended parking area. The width of this taxiway was reduced by fixed-wing aircraft parked on the right with their nosewheels on the taxiway and three helicopters parked on the left with both skids on the taxiway. Whilst attempting to taxi through the line of aircraft the Warrior's left wingtip struck a parked R22 helicopter. The pilot informed the Tower and shut the aircraft down. He then measured the wingspan of the Warrior as being 10 paces and the gap, 11 paces.

ACCIDENT

Aircraft Type and Registration:	Piper PA-28R-180 Cherokee Arrow, G-AVYT
No & Type of Engines:	1 Lycoming IO-360-B1E piston engine
Year of Manufacture:	1968
Date & Time (UTC):	23 March 2011 at 1050 hrs
Location:	Sturgate Airfield, Lincolnshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Propeller tips, lower surface of aircraft abraded and engine shock-loaded
Commander's Licence:	Private Pilot's Licence
Commander's Age:	40 years
Commander's Flying Experience:	298 hours (of which 28 were on type) Last 90 days - 6 hours Last 28 days - 2 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

The pilot reported that after two uneventful touch-and-go circuits at Gamston Airfield he flew to Sturgate Airfield, where he intended to fly a number of circuits before landing for fuel. When downwind for Runway 27 at Sturgate, the pilot believed that he had selected the landing gear down and had confirmed that the three green landing gear down indicator lights were illuminated. While the approach appeared to be normal, the aircraft landed with the landing gear partially retracted. Damage to the aircraft indicated that the landing gear started to extend late in the flare.

During the recovery from the runway, the aircraft was raised on jacks and the landing gear was selected down. All three legs engaged in the down locks and the green landing gear down indicator lights illuminated. While the PA-28R is equipped with a backup gear extender that automatically lowers the landing gear when the speed is below 95 kt and the engine power is reduced to idle, the system had been inhibited on G-AVYT.

INCIDENT

Aircraft Type and Registration:	Piper PA-34-200 Seneca, G-AZOT
No & Type of Engines:	2 Lycoming IO-360-C1E6 piston engines
Year of Manufacture:	1971
Date & Time (UTC):	15 April 2011 at 1111 hrs
Location:	Glenswinton, near Castle Douglas, Dumfries and Galloway
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to left wingtip, rear spar, propeller, engine and left landing gear
Commander's Licence:	Airline Transport Pilot's Licence
Commander's Age:	44 years
Commander's Flying Experience:	2,060 hours (of which 71 were on type) Last 90 days - 36 hours Last 28 days - 6 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The aircraft was landing on Runway 03 at Glenswinton, which is 380 m long and has a compacted gravel surface. When the brakes were applied the aircraft drifted to the left of the centreline and, towards the end of the runway and at low speed, it struck a tree. The aircraft's braking performance was probably degraded due to the poor condition of the right brake unit and the compacted gravel runway surface may have been a less effective surface for braking than a conventional paved surface.

History of the flight

The pilot was landing on Runway 03 at Glenswinton. He retracted the flaps and applied the brakes after touchdown, which was on the runway centreline. The right brake felt light, causing the pilot to suspect that it had failed. He then applied increased pressure to the left brake pedal, applied full right rudder and pumped the right brake. The right brake seemed to become more effective as the aircraft slowed but the pilot was unable to prevent the aircraft from drifting to the left of the centreline and departing the left side of the runway. When the aircraft was approximately 70 m from the end of the runway and travelling at slow speed, its left wingtip struck a tree and the left propeller contacted the ground.

Subsequent inspection revealed evidence of corrosion and only partial friction surface contact on the right brake disc.

Airfield information

Glenswinton is a private airstrip near Castle Douglas. The runway is 380 m long, with a compacted gravel surface and has a 5% upslope in the 03 direction.

Aircraft performance

The pilot estimated the landing distance required to be 366 m using the Normal performance chart, taking into account the temperature, landing weight and using zero wind (the wind at the time was light and variable) and a 2% upslope (the maximum on the chart). The short field performance chart was not available to him, although he was using a short field technique. The lack of any obstacles on the approach path allowed him to touch down close to the threshold which he felt acted in his favour.

Discussion

The pilot's estimate for the landing distance required of 366 m, based on the Normal performance chart, was only marginally less than the runway length of 380 m. He considered that the use of the short field landing technique, in combination with the favourable 5% upslope, would significantly reduce the landing distance required. However, the aircraft's braking performance was probably degraded due to the poor condition of the right brake and the compacted gravel runway surface may have been a less effective surface for braking than a conventional paved surface. Aircraft performance charts are produced using data from the flight testing of aircraft that are typically new and are being operated in ideal conditions.

The CAA recommend in, Safety Sense Leaflet 7 '*Aircraft Performance*', that the Public Transport factor of 1.43 is applied to the landing distance required for all flights. Also noted in the '*General Points*' in the leaflet is:

> *'Any benefit arising from an upslope on landing or a downslope on take-off will be minor and should be regarded as a bonus.'*

ACCIDENT

Aircraft Type and Registration:	Piper PA-34-200T Seneca II, G-BTGV
No & Type of Engines:	2 Continental Motors Corp TSIO-360-EB piston engines
Year of Manufacture:	1979
Date & Time (UTC):	7 March 2011 at 1022 hrs
Location:	Gloucestershire Airport, Cheltenham
Type of Flight:	Training
Persons on Board:	Crew - 2 Passengers - None
Injuries:	Crew - None Passengers - N/A
Nature of Damage:	Damage to nosegear doors, underside of nose, propellers
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	71 years
Commander's Flying Experience:	14,500 hours (of which 6,000 were on type) Last 90 days - 77 hours Last 28 days - 40 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and additional AAIB enquiries

Synopsis

During circuits at Gloucestershire Airport, the aircraft landed in what was described as a "slightly flat and firm" touchdown, following which the nose landing gear immediately retracted. The nose dropped, causing the propellers to contact the runway surface, and the aircraft subsequently came to a halt further down the runway. Neither occupant was injured.

The retraction may have occurred as a result of a slight 'out-of-rig' condition, although possible damage arising from an earlier heavy landing could not be ruled out. However, the PA-34 series of aircraft has a history of nose landing gear collapses, with no single cause having being identified, although there are a number of potential contributory factors. The aircraft manufacturer has introduced a number of measures, including a Service Bulletin, which have served to reduce the rate of this type of occurrence.

Circumstances of the accident

The aircraft had departed from Oxford on a Skills test for the student's Commercial Pilot's Licence. Following an uneventful navigation exercise the aircraft was routed to Gloucestershire Airport to conduct circuits. The student was instructed to descend on the 'dead side' and join the circuit downwind for Runway 09. The circuit was flown normally and on final approach the aircraft was cleared for a 'touch-and-go'. The approach was stable and, in the calm conditions, the commander assessed that the touchdown point was deeper into the runway than normal, although still safe. He described the actual touchdown as "slightly flat and firm", although he did not classify it as heavy. However, the nose landing gear immediately collapsed, causing the nose to drop and the propellers to contact the ground. The aircraft came to a halt on the runway and both occupants evacuated without difficulty.

Nose landing gear description

The nose landing gear (NLG) of the Piper Seneca series of aircraft is of the forward-retracting type and is hydraulically operated. When retracted, the gear is held up by hydraulic pressure in the actuator and, when extended, it is held in the down position by a geometric downlock mechanism. There are no locking hooks for either position. When the NLG is extended and under load it is prevented from collapsing by the drag link assembly (Figure 1). When the NLG is fully extended, the offset drag link centre pivot is below the centre line of the two end pivots, preventing the drag link assembly from collapsing when the landing gear is under load.

The geometry of the NLG is such that the aircraft's weight on the nosewheel applies a compressive load to the drag link assembly, which will tend to drive it more firmly into the safe over-centre condition when the gear is properly extended. However, should the drag link assembly be in an under-centre condition, the applied load will tend to cause the drag link to fold and the gear to retract.

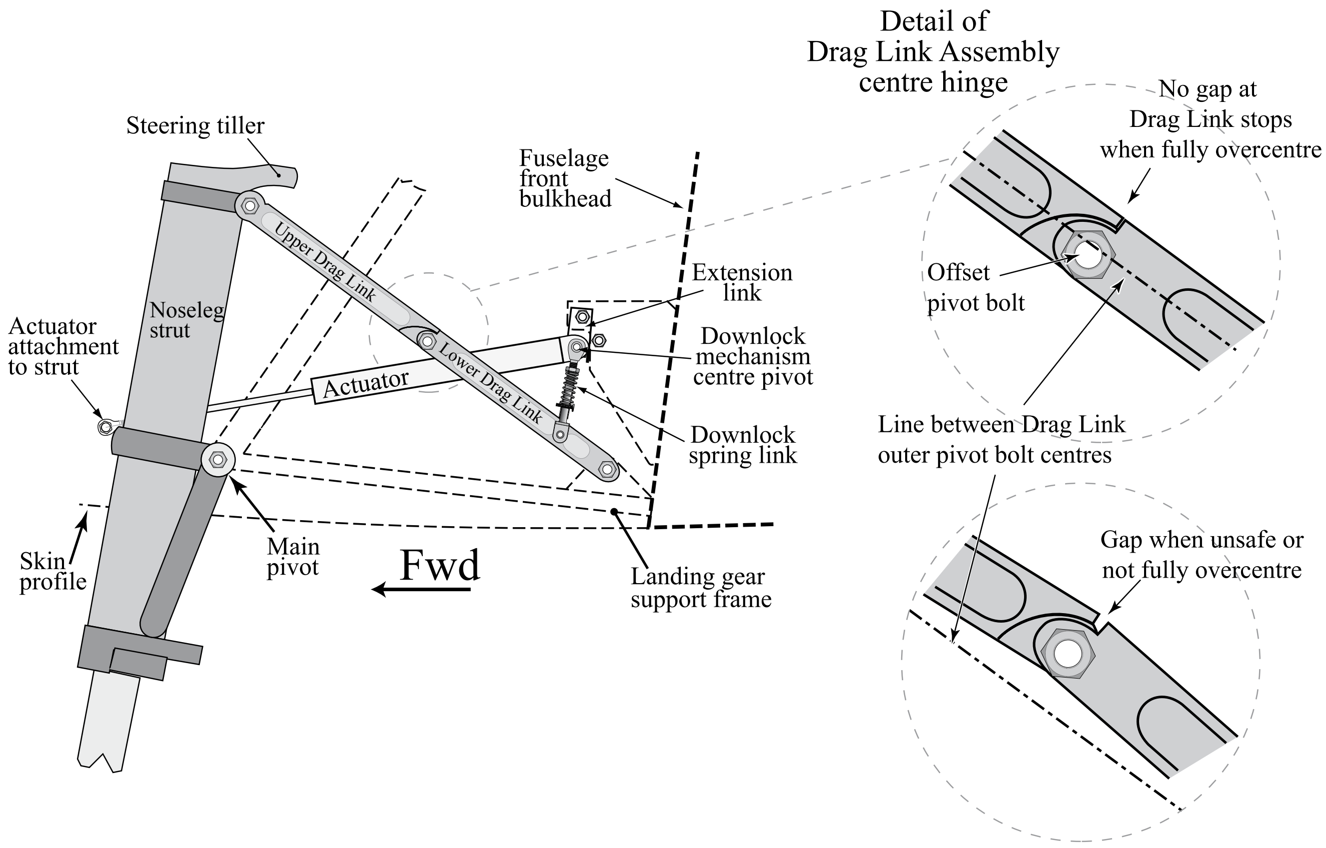

Figure 1

PA-34 nose landing gear side view showing main components in extended position

Examination of the aircraft

After the nose of the aircraft was raised, the nose landing gear was pulled into the locked-down position. It was then apparent that the upper eye end of the downlock link (Figure 1) was severely distorted, with additional damage to the front bulkhead, which can be seen in the photograph at Figure 2.

It is likely that the damage to the bulkhead and eye end was the result of the drag brace folding during the collapse, which would transfer the loads from the nose leg into the actuator and its attachment, at its upper end, to the bulkhead.

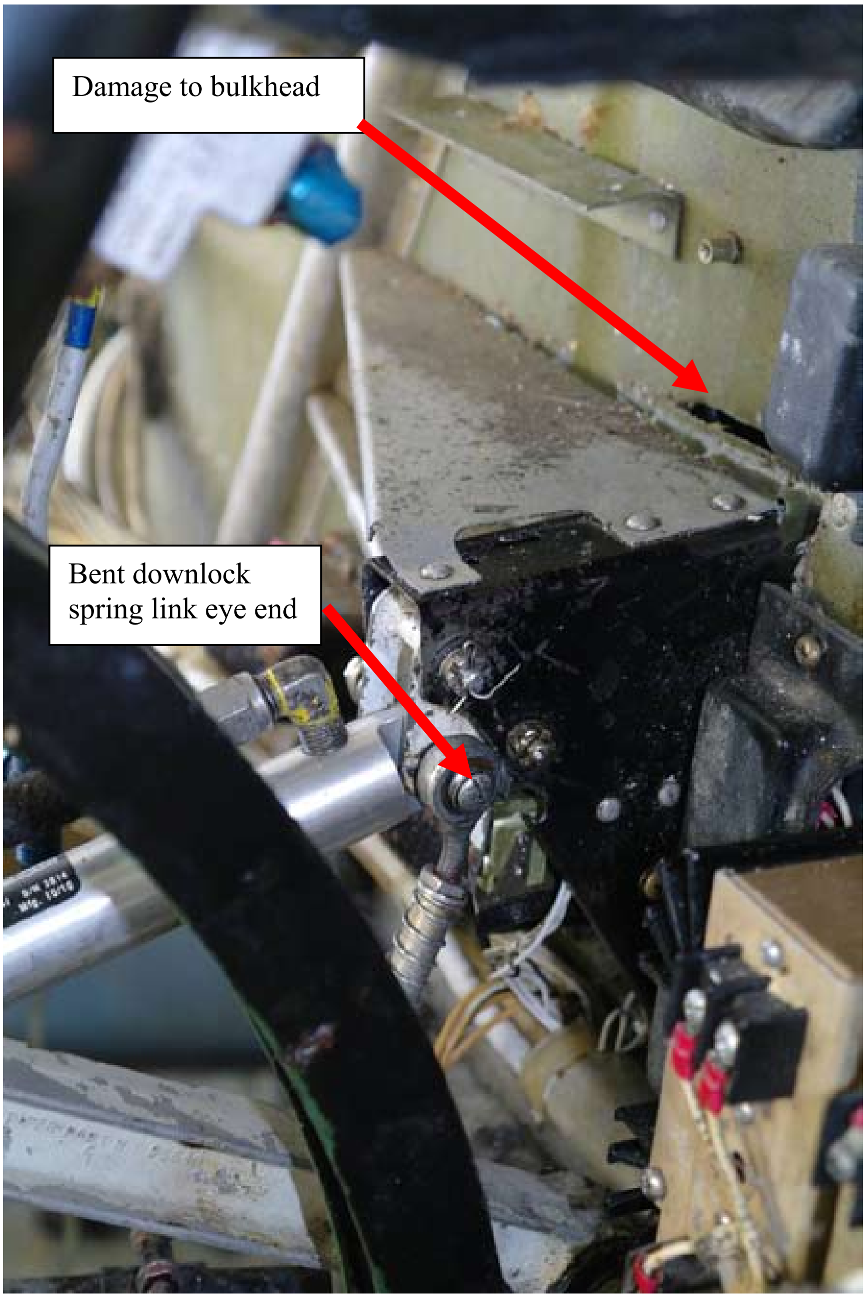

Figure 2

View of upper end of actuator attachment to structure, showing damage to bulkhead and bent eye end of downlock link

History of PA-34 NLG retraction problems

The Piper Seneca series of aircraft has a long history of nose landing gear collapses, with a number being investigated by the AAIB. The type has persistently suffered a noticeably higher rate of such incidents compared with most other 'light-twin' types. The historical aspects are described in more detail in reports on the accidents to G-EXEC and G-BEVG (amongst others), published in AAIB Bulletins 3/2002 and 6/2008 respectively; these reports also include detailed accounts of the rigging procedures for the NLG.

These investigations resulted in the AAIB making a number of Safety Recommendations and, in the USA, the Federal Aviation Administration (FAA) conducted a review of similar occurrences. The main outcome was that the manufacturer made a number of amendments to the Maintenance Manual and, in May 2003, issued Service Bulletin (SB) 1123. This introduced a number of maintenance actions and inspections which were to be conducted at intervals of 50 flying hours. This Service Bulletin was raised to Revision 'A' in November 2004 and Revision 'B' in April 2006. On 8 August 2005 the FAA issued Airworthiness Directive (AD) No 2005-13-16, which mandated SB 1123A and additionally required the replacement of the bolt that attached the upper drag link to the nose gear trunnion at 500 hour intervals. The 'comments' section of the AD includes the following:

> *'Piper conducted several ground and flight tests in an effort to determine the source of the [NLG retraction] problem. Unfortunately, due to the complicated design of the NLG, Piper could not isolate one specific problem.'*

The AD additionally listed a number of potential contributory factors identified in NLG collapses, including failure, or 'out-of-tolerances', of the retraction links and bolts, lack of cleanliness/lubricant in the components and an out-of-rig condition.

In the case of G-BTGV, the requirements of SB 1123B were most recently applied during a 100-hour inspection on 28 February 2011, some 28 flight hours prior to the accident. No flight cycle information was available, but training operations, such as that on which G-BTGV was engaged, can achieve up to 12 landings per hour. The maintenance personel were aware of the NLG system's vulnerability to misrigging and indicated that merely rotating the threaded eye end of the downlock spring link through 180º could potentially represent the difference between a correctly rigged and an out-of-rig condition. They also considered the possibility that one or more heavy landings since the previous compliance with SB 1123B may have caused some damage to the mechanism, affecting the rigging condition. Finally, they commented that the accident to G-BTGV was the first such occurrence they had seen for several years, which suggested that SB 1123B has been successful in reducing the number of NLG collapses.

Company investigation

Following the accident the aircraft's operator conducted an internal investigation, making a number of recommendations. One of these aimed to reinforce the use of the Technical Log for the purpose of making comments on engineering matters (including suspected heavy landings), as opposed to discussing them with the Operations department.

Discussion

This accident resulted from the uncommanded retraction of the nose landing gear and was the latest in a long history of similar occurrences. As with previous events, the NLG retraction could not be attributed to a single cause. There were, however, a number of potential contributory factors and the possibility of damage arising from an earlier, heavy landing could not be discounted. However, the accident reinforces the necessity of accurately rigging the NLG, an issue which is addressed by SB 1123B. The relative lack of recent similar events suggests that this SB has been effective in containing the problem, if not completely eliminating it.

ACCIDENT

Aircraft Type and Registration:	1) Starduster Too SA300, G-STOO 2) Westland Wasp HAS1, G-BZPP
No & Type of Engines:	1) 1 Lycoming IO-360-C1E6 piston engine 2) 1 Rolls-Royce Nimbus MK 10301 turboshaft engine
Year of Manufacture:	1) 2008 2) 1967
Date & Time (UTC):	5 March 2011 at 1547 hrs
Location:	RNAS Yeovilton, Somerset
Type of Flight:	1) Private 2) Training
Persons on Board:	1 Crew - 1 Passengers - None 2) Crew - 2 Passengers - None
Injuries:	1) Crew - 1 (Serious) Passengers - N/A 2) Crew - None Passengers - N/A
Nature of Damage:	1) Extensive 2) Extensive
Commander's Licence:	1) National Private Pilot's Licence 2) Airline Transport Pilot's Licence
Commander's Age:	1) 72 years 2) 66 years
Commander's Flying Experience:	1) 657 hours (of which 27 were on type) Last 90 days - 2 hours Last 28 days - 1 hour 2) 14,150 hours (of which 2,632 were on type) Last 90 days - 42 hours Last 28 days - 27 hours
Information Source:	Aircraft Accident Report Forms submitted by the pilots, local unit investigation report and additional material provided by the airfield operating authority

Synopsis

The Wasp helicopter was in a low hover, about 150 m in from the Runway 04 threshold. The pilot of the Starduster was flying an approach to Runway 04 but was not aware of the presence of the Wasp. The Starduster collided with the rear of the Wasp and crashed on the runway nearby, coming to rest in an upright attitude but tipped forward onto its nose. The Wasp yawed uncontrollably to the right and landed heavily, causing the left undercarriage to collapse.

Flying club operations

RNAS Yeovilton was closed for military operations at the time of the accident, so both aircraft were being flown in accordance with the procedures of the Yeovilton Flying Club (YFC). These required pilots of club aircraft to reach mutual agreement regarding the duty runway, unless the local gliding club was flying, in which case its duty instructor would nominate a duty runway.

Specific circuit instructions for operations under YFC procedures were not contained in the YFC operations manual. Runway 04 circuit direction was promulgated as right hand in Yeovilton Aviation Orders (a military document) and also shown as right hand in a commercially available flight guide.

YFC procedures stated that club aircraft operating at Yeovilton outside normal airfield hours were to use the Yeovilton Ground frequency (122.100 MHz), and make appropriate traffic information calls when flying in the visual circuit. However, if the local gliding club was flying, then the Common Glider Field Frequency of 129.975 MHz was to be used instead, in order to aid separation in the circuit between powered aircraft and gliders.

Wasp G-BZPP

The Wasp was carrying out a training detail from Runway 04. The weather was fine, with good visibility and a light wind from the north-east. There was no significant cloud.

The pilot of the Wasp was aware that the Starduster was airborne, having spoken to the pilot earlier and seen it climb out and turn to the left. As the circuit direction was right hand, the pilot believed that the Starduster had departed the circuit. The Wasp flew its first circuit right hand with a simulated hydraulic failure. The pilot reported making 'blind' radio calls on the Tower frequency of (120.800 MHz): he did not hear any radio calls from other aircraft or see another aircraft in the circuit.

The Wasp made a slow approach and came to a low hover, about 150 m beyond the threshold on the runway centreline. As it started its final descent to land, the crew felt a vibration, accompanied by an uncommanded and rapid yaw to the right. As it did so, the helicopter rolled left, causing the main rotor blades to strike the surface. It landed heavily and the left undercarriage collapsed. The helicopter came to rest after about 270° of yaw, tilted about 45° to the left. The crew, who were uninjured, shut down the engine and turned off the battery before vacating the aircraft through the pilot's door.

The crew were unaware that another aircraft had been involved until after they had vacated the helicopter and saw the Starduster nearby. The aircraft was upright but tipped forward onto its nose. The pilot of the Starduster was conscious but dazed, and had apparently hit his head on a GPS mounting bracket which projected from the instrument panel.

The Wasp crew righted the aircraft and one of them, who was a medical doctor, rendered first aid. Having ascertained that it was safe to do so, the pilot was helped from his cockpit by the Wasp crew who attended him until the emergency services arrived. The Starduster pilot was taken to hospital with serious head injuries.

Subsequent examination of G-BZPP showed that the aircraft's radio was tuned to the Ground frequency (122.100 MHz) and not the Tower frequency.

However, the Tower frequency was set at 'Standby' and the frequencies could have been inadvertently interchanged during the crew's egress. There were no recorded transmissions from either aircraft on the Tower frequency, although transmissions from the air ambulance helicopter and another aircraft on frequency shortly after the accident were recorded. The Wasp co-pilot's transmission key was reported as being inoperative, which would account for intended transmissions made on the co-pilot's side on 120.800 MHz not being recorded. Radio reception was not affected by this fault.

Starduster G-STOO

Prior to leaving the club hangar, the pilot of the Starduster ascertained that no other club aircraft were due to be flying. Whilst walking to his aircraft, he saw the pilot of a Chipmunk that had just landed, who said that no-one else was flying and that he himself did not intend to fly again. However, after a late change of plan, that same pilot was to fly the Wasp. This fact was not communicated to the Starduster pilot, who thus believed that he would be the only powered aircraft operating.

The Starduster pilot saw a glider parked at dispersal with three people in attendance. Thinking that gliding may be taking place, he called on the glider frequency but got no clear response. He then tried the Tower frequency but again got no response, so chose to remain on the glider frequency.

The pilot took off and started flying left hand circuits on Runway 04, making 'blind' circuit calls on the gliding frequency and listening out for short periods on the Tower frequency. The pilot reported that it was not unusual to vary the circuit direction outside normal operating hours. On his fifth circuit, after rolling out over the threshold from his normal curved approach, the Starduster pilot saw the Wasp ahead and slightly to the left. He immediately applied power and pulled up and to his right.

The pilot's next recollection was being treated by a paramedic after the accident. He had suffered facial and eye injuries and was taken to hospital by ambulance.

Subsequent inspection of the aircraft revealed that the pilot's left side seat harness anchor point had been compromised in the collision with the Wasp, so he was only partially restrained when the aircraft hit the runway.

Other damage

Parts of the Wasp's main rotor blades separated after striking the runway and were thrown some distance from the accident site. One piece caused minor damage to civilian property at a residence close to the airfield boundary.

Unit investigation

The Commanding Officer, RNAS Yeovilton, ordered that a unit investigation be carried out into YFC operations. As a result of recommendations made in the investigation report, the YFC introduced a number of changes to its procedures for operations outside normal airfield hours. These included the establishment of a Duty Pilot post with appropriate supervisory responsibilities, enhanced 'booking out' procedures, mandatory briefing for pilots, and the mandatory use of a single frequency (120.800 MHz) by all aircraft in the visual circuit. Additionally, limitations were put in place regarding mixed (rotary and fixed-wing) flying.

SERIOUS INCIDENT

Aircraft Type and Registration:	Bell 206L-4 Longranger IV, G-PTOO
No & Type of Engines:	1 Allison 250-C30P turboshaft engine
Year of Manufacture:	1995
Date & Time (UTC):	3 March 2011 at 1512 hrs
Location:	London City Airport
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Tail rotor balance weight detached, damage to tail rotor gearbox mountings and tail boom
Commander's Licence:	Commercial Pilot's Licence
Commander's Age:	46 years
Commander's Flying Experience:	2,200 hours (of which 480 were on type) Last 90 days - 30 hours Last 28 days - 15 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot

Synopsis

The pilot carried out a precautionary landing at London City Airport, after the onset of vibration during the cruise. Examination revealed that a bolt, securing balance weight assemblies to a tail rotor blade, had failed due to the formation of a crack in the bolt shank which propagated in fatigue. The helicopter manufacturer confirmed that this was the first reported occurrence of this nature relating to this design of tail rotor system.

History of the flight

Whilst in cruising flight, the pilot experienced the onset of a high frequency vibration through the airframe and flight controls. The pilot declared a PAN and made a precautionary landing on an area of grass beside the runway at London City Airport. An inspection of the helicopter revealed that a tail rotor balance weight assembly had detached from one of the tail rotor blades. The balance weight assembly, together with a fractured section of its securing bolt was discovered close to the helicopter.

Description

Each tail rotor blade is balanced by the use of individual weights mounted on a bracket to form an assembly. Two such assemblies are installed on each blade, one either side of the blade root, see Figure 1. They are held in place by a bolt which passes through both

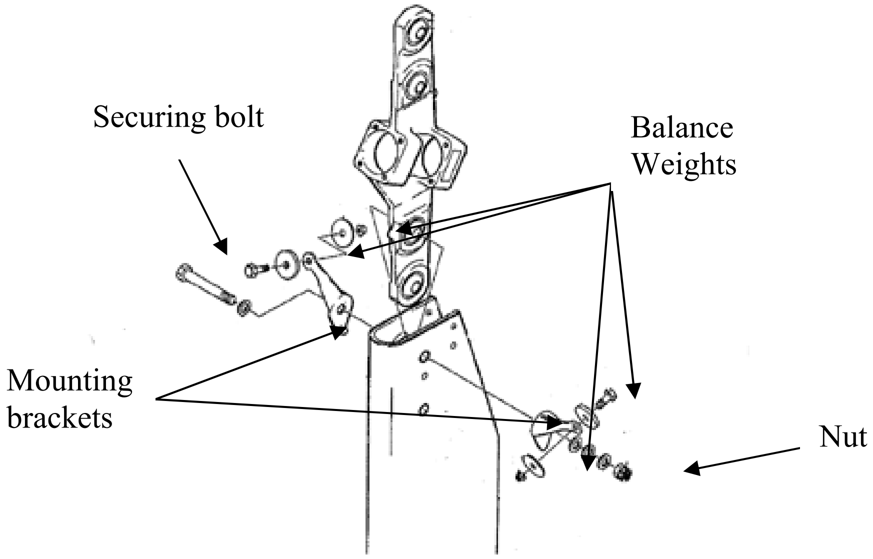

Figure 1

Tail rotor balance weights and brackets
(Courtesy of Bell Helicopters)

assemblies and the blade. The bolt is secured using a castellated nut, which is prevented from loosening by the installation of a split pin.

Investigation

Failure of the securing bolt allowed the associated tail rotor balance weight assemblies to become loose, producing the vibration experienced by the pilot. The discovery of the balance assembly, which detached from the tail rotor blade, near to the helicopter, indicated that it had remained on the tail rotor blade until the later stages of the flight. An inspection of the helicopter revealed additional damage to the tail rotor gearbox mountings and the associated structure of the tail boom.

The bolt had failed approximately 12 mm from the end of its shank and included the securing nut and associated split pin. The remaining portion of the bolt had remained in-situ, retaining the second balance weight assembly to the tail rotor blade. Examination of the remains of the bolt showed that a crack had formed within the bolt shank. This had propagated due to a fatigue mechanism until the bolt shank fractured in overload. The initiation point of this crack was found to coincide with a section of the bolt shank where the cadmium plating had been worn away by contact with the structure of the tail rotor blade, but no cause for the initiation of the crack could be identified.

Prior to removal of the bolt securing the balance weight assemblies to the remaining tail rotor blade, the 'break-away' torque of the nut was measured and found to be within the expected values. Inspection of the bolt showed a similar, but less pronounced, wear pattern on the cadmium plating of the shank. The bolt was sectioned to determine if a crack was present in its shank; no evidence of crack initiation was found.

The tail rotor hub assembly fitted to the Bell 206L-4 is subject to a 2,500 flying hour overhaul requirement. The helicopter's records confirmed that the last overhaul of the tail rotor assembly had been carried out 1,691 flying hours prior to the incident and whilst the helicopter had been operating on another national register. The records did not contain any detailed information regarding the overhaul of the tail rotor gearbox hub. Therefore, it was not possible to verify the history of the failed balance weight bolt.

The tail rotor hub assembly fitted to the Bell 206L-4 is also fitted to the Bell 407 and 427 helicopter types. The helicopter manufacturer confirmed that there have been no reported failures of the bolts securing the tail rotor blade balance assembly bolts on any of these types.

ACCIDENT

Aircraft Type and Registration:	Savannah Jabiru(5), G-CEEX
No & Type of Engines:	1 Jabiru Aircraft Pty 2200 piston engine
Year of Manufacture:	2006
Date & Time (UTC):	25 March 2011 at 1500 hrs
Location:	Hollym Airstrip, East Yorkshire
Type of Flight:	Private
Persons on Board:	Crew - 1 Passengers - 1
Injuries:	Crew - None Passengers - None
Nature of Damage:	Damage to nose landing gear, forward fuselage, flight controls and propeller; engine shock-loaded
Commander's Licence:	National Private Pilot's Licence
Commander's Age:	55 years
Commander's Flying Experience:	248 hours (of which 110 were on type) Last 90 days - 17 hours Last 28 days - 9 hours
Information Source:	Aircraft Accident Report Form submitted by the pilot and subsequent AAIB enquiries

The pilot reported that he flew over the airfield prior to landing, and observed that the wind was light and from approximately 110°. He decided to land on Runway 17, rather than the more into-wind Runway 13, because he was concerned about landing towards cliffs which form the eastern boundary of the airfield. On approach, he judged that the aircraft was "rather too high", but considered that there was sufficient runway ahead to land. The aircraft bounced on touchdown, the nose landing gear buckled under the fuselage, and the propeller struck the runway surface. The pilot considered that the aircraft had been affected by rotary airflow in the lee of the cliffs, and that the second touchdown was on a ridge running across the airfield.

The airfield operator had granted the pilot permission to use the airfield by telephone, but had advised him to make radio contact before landing, with the intention of warning him not to approach over the cliffs (the operator's standard practice). The pilot did not call on the radio before landing. Published information concerning the airfield includes the warning *'Rwy 17 not recommended for first time visitors'*.

ACCIDENT

Aircraft Type and Registration:	Swift S-1, G-IZII
No & Type of Engines:	N/A
Year of Manufacture:	1993
Date & Time (UTC):	22 August 2010 at 1022 hrs
Location:	Shoreham Airfield, West Sussex
Type of Flight:	Aerial work
Persons on Board:	Crew - 1 Passengers - None
Injuries:	Crew - 1 (Serious) Passengers - N/A
Nature of Damage:	Substantial
Commander's Licence:	Glider Pilot's Licence
Commander's Age:	35 years
Commander's Flying Experience:	473 hours (of which 57 were on type) Last 90 days - 20 hours Last 28 days - 2 hours
Information Source:	AAIB Field Investigation

Synopsis

The glider was in a low level final turn to land when it stalled, departed controlled flight and crashed onto the runway. One Safety Recommendation was made.

History of the flight

G-IZII was to be flown at the Shoreham Air Show as part of a display by a team consisting of a glider and tug aircraft combination and two Twister aircraft. There were two runways in use, asphalt Runway 20 and, to the east, the parallel grass Runway 20. The weather was poor, causing some participants to cancel their displays. The display organiser discussed the conditions with the team leader and they decided that it was suitable for the team to display. Weather conditions reported during the hour leading up to the accident are shown in Table 1.

The team decided that they would fly their low-level display profile, which could be used in cloud conditions that precluded the vertical manoeuvres that were part of their full display. G-IZII would remain on tow throughout the display. One Twister would remain with the glider-tug combination and would barrel roll around the glider during part of the display. The remaining Twister, flown by the team leader, would takeoff but not participate in the display. Towards the end of the display, and while still attached to the tug, the pilot of G-IZII would perform some aileron rolls into wind along the line of asphalt Runway 20. Following this "roll-on-tow", he would release from the tug and land downwind aiming to stop at the launch point near the threshold of grass Runway 20.

Time (UTC)	Surface wind	Visibility	Cloud cover[1]
0920	290° 3 kt	4,200 m	FEW at 300 ft, SCT at 500 ft, BKN at 700 ft
0950	230° 4 kt	6,000 m	SCT at 600 ft, BKN at 800 ft
1002	230° 4 kt	6,000 m	SCT at 600 ft, BKN at 800 ft
1020	210° 6 kt	8,000 m	SCT at 500 ft, BKN at 700 ft

Table 1

Weather reports before the accident

Before departure, the team leader was informed by ATC that there was scattered cloud at 600 ft and broken cloud at 800 ft. The team took off at 1017 hrs and began their display with the team leader holding away from the display area in his Twister. As the display progressed, the team discussed the weather conditions on the radio and the team leader was asked to report the cloud base, which he estimated to be 500 ft aal. The other Twister pilot decided that the weather was not good enough to barrel roll around G-IZII and cancelled that part of the display.

The tug pilot positioned for the roll-on-tow just below the 500 ft cloud base, at between 80 and 90 kt, on the centreline of asphalt Runway 20 and with the crowd on his left. The glider pilot performed three aileron rolls behind the tug but, as he regained upright flight after the third roll, considerable slack developed in the aerotow rope. The pilot disconnected from the tug before the slack was taken up and turned right to position for a landing at the launch point. As the launch point came into view, the pilot judged that he would overshoot it and he extended the airbrakes to bring the landing point closer. Approximately seven seconds later, having crossed to the east of the asphalt runway, he realised he would still overshoot the launch point and that his only option was to turn left through approximately 180° to land on the asphalt Runway 20. He retracted the airbrakes and began a left turn. Figure 1 shows the ground track of the glider.

The pilot recalled feeling that the aircraft was "really low" and after about 45° of turn he felt the left wing drop as the aircraft departed controlled flight. Two seconds later the left wingtip hit the runway surface immediately before the nose, with the aircraft rolling left in a steep nose-down attitude. The nose section broke approximately half way along the canopy rail, although it remained connected to the fuselage, and the canopy detached before the aircraft came to rest. The pilot was able to remove himself from the wreckage but was subsequently taken to hospital with back injuries.

Information from the pilot

The pilot had been displaying gliders since 2006 and had flown 27 displays. He said that the number of low level display training flights the team had completed had been limited because many gliding club managers were not comfortable with the reduced safety margins implicit in the use of display limits during training. However, the pilot met the recency requirements of

Footnote

[1] FEW cloud means there was 1 or 2 eighths of cloud cover; SCT means 3 or 4 eighths; BKN means 5 to 7 eighths.

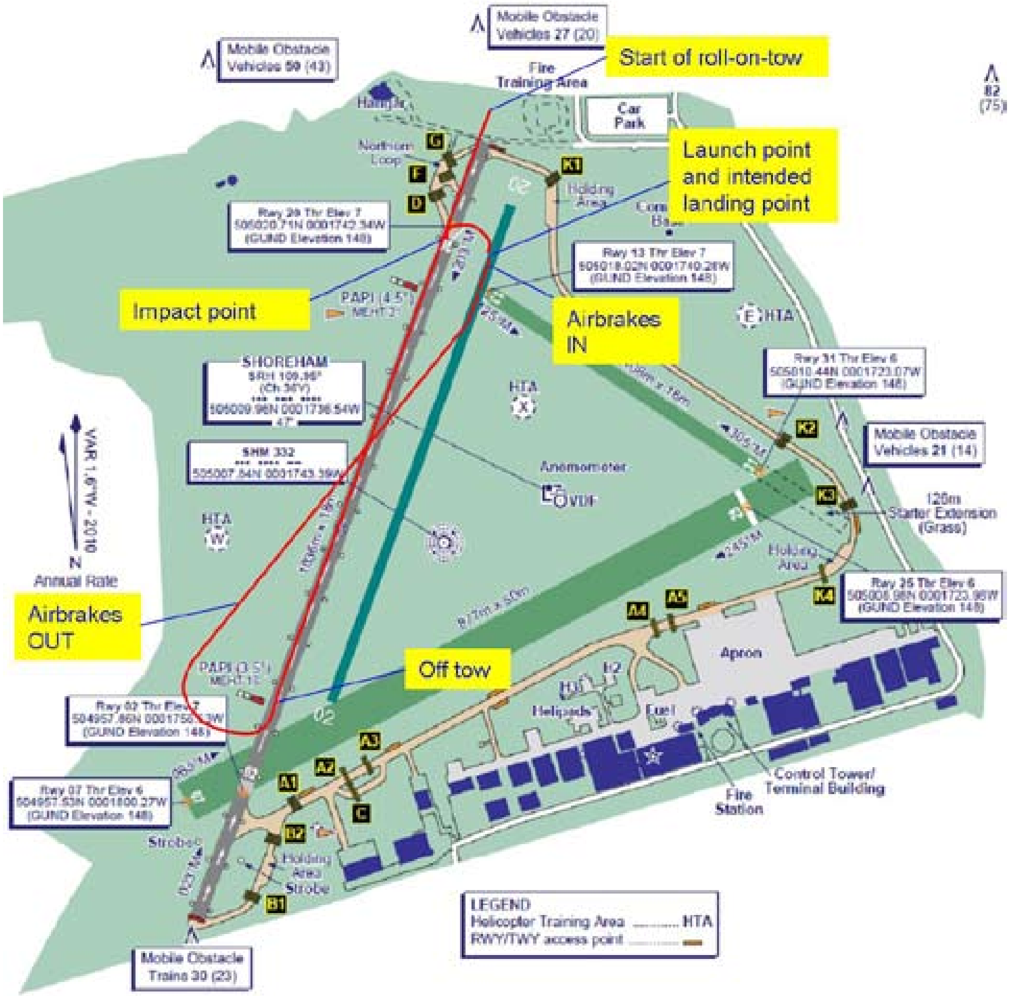

Figure 1

Ground track flown by G-IZII

Civil Aviation Publication (CAP) 403[2] and stated that he never felt under-prepared for a display.

The pilot intended to land at the launch point because it would look good as part of the display and minimise any delay to the team's subsequent departure that might be caused by having to retrieve G-IZII from another point on the airfield. Generally, the pilot preferred to fly past the launch point heading downwind before turning into wind to land but he had often landed downwind and was comfortable in doing so.

Following the third roll-on-tow, the aerotow rope bowed more than normal, prompting the pilot to disconnect from the tug before the slack in the line was taken up. He wanted to avoid breaking the weak link in the aerotow rope and was concerned that maintenance action required to replace the link would delay the team's subsequent departure. The glider was just below the cloud base at approximately 85 kt – the last airspeed the pilot recalled seeing – and he considered

Footnote

2 CAP 403 – '*Flying Displays and Special Events: A Guide to Safety and Administrative Arrangements*'. The recency requirements were for three full display sequences to be flown within the previous 90 days, with at least one display sequence flown or practised in the specific type of aircraft to be displayed.

that he was suitably positioned to enable him to land at the launch point. This judgement, however, was not based on any prior assessment of the conditions required at release such as height, speed and position over the airfield that would enable a safe landing to be made at the launch point.

The pilot first realised that G-IZII might overshoot the launch point after he disconnected from the tug and turned right through 180°. He considered turning left through 180° immediately in order to land into wind but decided that he would probably overshoot the upwind end of the airfield if he did so. He judged the surface beyond the launch point to be unsuitable for landing.

On reflection, the pilot believed there had been too much emphasis on landing at the launch point to the detriment of good airmanship and he thought this was due, to some extent, to the pressures particular to displaying at an air show. He thought that he had become used to flying with limits lower than those used normally within the gliding community and that "the abnormal had become normal".

The pilot had experienced an actual break in the aerotow rope in similar circumstances once before during training at a different airfield. At the time of the break, the glider was "over the upwind boundary hedge" of the airfield and, having "settled the glider", the pilot turned through 180° to land downwind, although he recalled that the wind on the day was less than 5 kt. The pilot had also landed following the roll-on-tow during training but he reported that he released from the tug no lower than 700 ft aal, which enabled him to fly a normal circuit to land.

Events leading to the accident

Evidence available to the investigation included video taken by spectators, video taken from within the cockpit and professional quality photographs. This evidence, when combined with evidence from the pilot, allowed a detailed assessment to be made of the events leading up to the accident.

The glider impacted the ground 23 seconds after the pilot released from the tug and 18 seconds after the pilot first saw the launch point. For analysis, the events leading to the accident were split into three phases: the 180° turn off tow; the period during which the glider was pointing at the launch point and had its airbrakes extended; and the final turn, the start of which was marked by the pilot retracting the airbrakes.

During the first phase, the pilot used small rudder inputs and there was little sideslip indicated by the piece of string attached to the top of the canopy. The pilot appeared to divide his attention between looking into the turn, looking ahead at the aircraft attitude, and looking at the ASI.

While the aircraft flew towards the launch point in phase two, there were short periods where left bank was applied, each of which was accompanied by the application of left rudder. The pilot looked towards the ASI once, 10 seconds before impact, and stated later that, although he could not recall the indicated airspeed, he would have been aiming for 65 kt IAS. Seven seconds before impact, G-IZII was between approximately 35 ft and 40 ft agl. For the rest of the time in phase two, the pilot was looking ahead either side of the glider's nose with a growing realisation that he was not going to be able to land at the launch point. This realisation was accompanied by increasing alarm at his lack of options.

During the third phase, the pilot did not look left into the turn towards the new landing area or look at the ASI; his attention was fixed ahead and slightly to the left of the nose. The turn was flown with approximately 50° to 60° of bank with left rudder applied throughout. During the turn, the airbrakes were selected out momentarily four times, although they were fully extended only once, and they were selected out once more immediately before impact. When the aircraft stalled, indicated by a distinct drop in the nose attitude, sideslip was present and the aircraft departed controlled flight, impacting the ground two seconds later.

Information from the team leader

The team leader stated that the glider had a stall warning system but that Swift pilots often chose not to turn it on (it was not on during the accident flight). He considered that a minimum cloud base of 500 ft was required in order for the team to fly their low level display profile, and he believed the tug and glider combination to be a single aircraft for the purposes of CAP 403 and display flying.

Following a previous display flight where the aerotow rope broke leaving the glider in a similar position to the accident flight, the team leader reviewed the safety of the display and concluded that, following the launch phase, the glider could glide back to the airfield for a safe landing from any point in the display. The low level part of the display was flown approximately 25 kt above approach speed giving the glider more energy and increasing the safety margins.

The team leader stated that glide range is determined by assessing angles, particularly in the circuit, and that the progress of a glide (whether the glider will overshoot or undershoot the intended landing point) is determined by observing changes in those angles. He stated that pilots could not pre-plan circuits using ground reference points because of the variation caused by even small differences in height, speed and wind speed.

Glider handling

When nearing the ground, pilots are likely to gain an impression of a glider's groundspeed by the flow of objects in their peripheral vision and, if landing downwind, the groundspeed is likely to be higher than normal. If a pilot does not monitor the ASI when landing downwind, he or she might reduce the indicated airspeed inadvertently in order to achieve the same impression of groundspeed as that experienced during normal into-wind landings. The pilot was aware of this phenomenon and had experienced it previously. The tailwind at the time of the accident was approximately 5 kt.

The manufacturer of Swift S-1's stated that its stalling speed is 39 kt, but during a final turn flown with a bank angle between 50° and 60°, such as in the accident flight, this would increase to between 49 kt and 55 kt[3]. If the final turn was flown at 50° angle of bank, the wing tip would have been 4.86 m (16 ft) below the centreline of the glider[4]. If the turn was started at a height of 40 ft aal, the wing tip clearance from the ground would have been 24 ft.

In his book *Gliding Safety*[5], Derek Piggott discussed spin related accidents and handling in low level final turns. He wrote that many spin accidents:

Footnote

[3] The level flight stalling speed increases by the square root of the load factor in the turn. The load factor in the turn is given by the secant of the bank angle.

[4] The wingspan is 12.68 m.

[5] Piggott D (1991) *Gliding Safety* London: A & C Black Ltd.

'are caused by poor planning, which leads to situations involving difficult manoeuvring near the ground, putting pilots under stress so that they make mistakes or fly badly enough to stall and spin in.'

In addition, he wrote that, when a glider is very low, pilots often use too much rudder in an effort to complete the final turn.

'Over-ruddering during the final turn creates extra drag and height loss, and helps to cause the nose to drop. If the pilot stops the nose from dropping by easing back on the stick instinctively, the speed will decrease further.'

Civil Aviation Publication (CAP) 403

CAP 403 – '*Flying Displays and Special Events: A Guide to Safety and Administrative Arrangements*' is intended to be a code of practice to ensure the safety of participants and spectators at air shows. It states that:

'The minima and standards quoted [in this manual] *should be treated as almost absolute unless sound logic demands otherwise.'*

CAP 403 states that minimum weather conditions for displays must be determined in advance and strictly observed. The recommended minima relevant to this investigation are shown in Table 2.

The stalling speeds of the Swift and the Twisters quoted by their manufacturers were below 50 kt. For such aircraft flying solo or in formation, a full aerobatic display required no significant cloud below 800 ft and a flypast required no significant cloud below 500 ft. CAP 403 does not specify separate criteria for flat aerobatic displays by aircraft in this category.

			Weather minima	
Type of aircraft	**Type of display**		**Cloud ceiling[6] or significant cloud (4/8 or more)**	**Visibility**
V/STOL aircraft, rotorcraft and other aircraft with a stalling speed below 50 kt	Flypasts	Solo aircraft	500 ft	1,500 m
		Formations	500 ft	3,000 m
	Full aerobatic displays	Solo aircraft	800 ft	3,000 m
		Formations	800 ft	5 km
Flying displays by other aircraft	Flypasts or flat aerobatic displays	Solo aircraft	500 ft	3,000 m
		Formations	800 ft	5 km

Table 2

CAP 403 weather limits

Footnote

[6] CAP 393 *Air Navigation: The Order and the Regulations* defines cloud ceiling as '*the vertical distance from the elevation of the aerodrome to the lowest part of any cloud visible from the aerodrome which is sufficient to obscure more than one-half of the sky so visible*'.

Shoreham flying display instructions

The flying display instructions issued to participants in the air show stated that:

> *'Display weather minima will be in accordance with and as set out in CAP 403.'*

The minima applicable to this accident shown in the display instructions are reproduced in Table 3. There were differences from CAP 403, which are shown in bold italics.

The display instructions allowed flat aerobatic displays by aircraft such as the Swift or Twister flown solo or in formation providing there was no significant cloud below 500 ft. The instructions also allowed full aerobatic displays from solo aircraft providing there was no significant cloud below 500 ft.

CAP 393 '*Air Navigation: The Order and the Regulations*'

For the purpose of avoiding aerial collisions, CAP 393 states that:

> *'A glider and a flying machine which is towing it shall be considered to be a single aircraft under the commander of the flying machine.'*

CAP 403 does not explain whether or not this interpretation applies when considering a glider and tug combination at an air show.

Glider certification

The Polish CAA certificated the Swift S-1 in August 1992 to requirements contained in *JAR-22 Sailplanes and Powered Sailplanes*. In June 2005, airworthiness oversight for the type transferred to EASA and the original Polish Type Certification Data Sheet (TCDS) was replaced with EASA TCDS A.038. Design requirement JAR 22.561 refers to emergency landing conditions and states that:

			Weather minima	
Type of aircraft	**Type of display**		**Cloud ceiling or significant cloud (4/8 or more)**	**Visibility**
V/STOL aircraft, rotorcraft and other aircraft with a stalling speed below 50 kt	Flypasts ***or flat aerobatic displays***	Solo aircraft	500 ft	1,500 m
		Formations	500 ft	3,000 m
	Full aerobatic displays	Solo aircraft	***500*** ft	3,000 m
		Formations	800 ft	5 km
Flying displays by other aircraft	Flypasts or flat aerobatic displays	Solo aircraft	500 ft	3,000 m
		Formations	800 ft	5 km

Table 3

Display instruction weather limits

> *'The structure must be designed to give each occupant every reasonable chance of escaping serious injury in a crash landing when proper use is made of belts and harnesses provided for in the design, in the following conditions:*
>
> *An ultimate load of 6 times the weight of the sailplane acting rearward and upwards at an angle of 45° to the longitudinal axis of the sailplane acts on the forward portion of the fuselage at the foremost point(s) suitable for the application of such a load.'*

The EASA TCDS for the Swift S-1 contains an exemption from this part of the certification basis stating:

> *'Fuselage structure verified up to 77% of emergency landing ultimate loads.'*

Although airworthiness of the Swift S-1 was not reassessed by EASA when the type was transitioned to its oversight, EASA commented that an exemption was probably justified by the nature of operation of this aerobatic glider: it would not normally be operated using winch launches or for cross-country flights, and was expected to perform standard approaches after local flights.

The TCDS also contains an exemption from JAR 22.207, a requirement which states that:

> *'The stall warning must begin at a speed between 1.05 and 1.10 V_{S1} and must continue until the stall occurs.'*

The exemption states that the stall warning is outside the required limit. In order to comply with JAR 22.207, the TCDS includes in the minimum equipment list for the Swift S-1 a stall warning device that is required to be turned on during flight.

The current certification requirements for gliders are given in EASA document CS-22 *Certification Specifications for Sailplanes and Powered Sailplanes*. Certification Specification (CS) 22.561 for the emergency landing condition increases the ultimate load requirement within JAR 22.561 (above) from six to nine times the weight of the sailplane. In the Acceptable Means of Compliance (AMC) section of EASA document CS-22, AMC 22.561 discusses the emergency landing situation and notes:

> *'Energy-absorbing seats, seat cushions or seat mountings constitute another means of improving safety by reducing the load on the occupant's head and spine in a crash.'*

Analysis

Glider handling

The evidence showed that the glider stalled in the final turn with rudder applied and with sideslip present, leading to a departure from controlled flight at too low a height to allow recovery. The video evidence suggested that the pilot did not look at the ASI for 8 seconds before the aircraft stalled. It is possible, therefore, that he inadvertently allowed the glider's airspeed to reduce as he tried to achieve, while attempting to land downwind, the more usual impression of groundspeed gained from landing into wind. It was also possible that the pilot began the final turn below the target speed of 65 kt and with a wing tip clearance of approximately 24 ft. Rudder applied during the turn, and the momentary selection of airbrakes, would have increased the drag on the glider and, if the pilot eased back on the control column to prevent the nose from dropping, the speed would have decreased further.

The glider's stalling speed would have increased in the turn to approximately 55 kt, reducing further the margin above stalling speed. Eventually the margin was completely eroded and the aircraft stalled. The investigation did not determine whether a functioning stall warning system would have activated in sufficient time for the pilot to prevent the stall and complete the landing safely.

During the turn away from the tug aircraft, the pilot used small rudder inputs and appeared to scan the glider's attitude, airspeed and flightpath. During the final turn, however, rudder was applied throughout, airbrake was selected intermittently, the pilot's scan was limited to ahead and slightly left of the nose and he did not look at the airspeed. It is probable that the alarm experienced by the pilot, along with the fact that he had to fly the final turn so close to the ground, induced stress that affected his ability to fly within the safety margins available. It is also possible that the aircraft had insufficient energy to complete the turn safely.

During his safety review, the team leader established that the glider had sufficient energy to land safely from any point in the display but G-IZII had too much, rather than too little, energy to turn directly to the launch point and land safely. For glider pilots to use changes in angles to judge their approach, they must be able to see the point at which they intend to land. The launch point was behind the pilot of G-IZII, so it would have been very difficult for him to use this technique to judge the earliest position from which he could turn towards the launch point and not have too much energy to land safely. Although when flying a circuit ground features might not be useful, in this case using a pre-planned ground reference point might have prevented the pilot from turning away from the tug and entering the circuit too early. Therefore:

Safety Recommendation 2011-031

It is recommended that the Swift Aerobatic Display Team assess prior to each display the conditions required for the glider to land safely when it releases from the tug.

CAP 403 weather minima

Before the team took off, ATC reported cloud scattered at 600 ft and broken at 800 ft. CAP 403 defines significant cloud cover as being 4/8 or more; cloud reported as "scattered" implies cover of either 3/8 or 4/8. Therefore, a report of "scattered" cloud contains insufficient information to determine if cloud cover is "significant" in the context of display weather minima, making it difficult to judge before takeoff whether a particular type of display is permitted.

Display minima recommended in CAP 403 implied that a full aerobatic display was permitted if the "scattered" cloud at 600 ft provided cover of less than 4/8. Otherwise, the display should be limited to flypasts. The display instruction, however, whose limits were to be strictly observed, permitted a flat aerobatic display of aircraft in formation or the full aerobatic display of a solo aircraft, if there was no "significant" cloud below 500 ft. These limits were lower than those in CAP 403 because of an oversight, rather than as a result of a considered decision, but it was the 500 ft limit that was used by the team in deciding whether they were permitted to display.

Once airborne, pilots rely on their own judgement to decide whether to begin or continue a display and, in this case, the Twister pilot decided to cancel part of his display because he considered the weather unsuitable. Nevertheless, weather information available to pilots at air shows should be unambiguous. Accordingly, the following safety actions have been taken:

Safety action

The Civil Aviation Authority agreed to consider, in its ongoing review of CAP 403, the circumstances in which cloud should be considered significant.

The display organisers agreed to review their display instructions to ensure that they are in accordance with CAP 403 in the future.

Crashworthiness

G-IZII was designed as an aerobatic glider that would normally be landed in a conventional way following a local flight and it was only verified to 77% of the emergency landing ultimate load requirement of JAR 22.561. This accident was survivable but gliders designed to meet the emergency landing requirements of CS 22, and using energy absorbing materials in the seat structure, cushions or mountings, should reduce the level of injury suffered by pilots in similar accidents in the future.

FORMAL REPORT CORRECTION

AAIB File: EW/C2009/02/02

Aircraft Types and Registrations: Grob 115E Tutor, G-BYUT and Grob 115E Tutor, G-BYVN

Date & Time (UTC): 11 February 2009 at 1047 hrs

Location: Near Porthcawl, South Wales

Information Source: Formal Investigation

Aircraft Accident Report 6/2010, pages ix and 28 refer:

This report was amended with the following corrections on the AAIB website on 18 May 2011.

Page ix – GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

ARCC Area Rescue Co-ordination Centre should read:

> ARCC **Aeronautical** Rescue Co-ordination Centre.

Page 28, under heading **1.15.1.1 Satellite based alerting system**

In the second paragraph,

> Area Rescue Co-ordination Centre (ARCC) should read **Aeronautical** Rescue Co-ordination Centre (ARCC).

FORMAL AIRCRAFT ACCIDENT REPORTS ISSUED BY THE AIR ACCIDENTS INVESTIGATION BRANCH

2009

3/2009 Boeing 737-3Q8, G-THOF
on approach to Runway 26
Bournemouth Airport, Hampshire
on 23 September 2007.

Published May 2009.

4/2009 Airbus A319-111, G-EZAC
near Nantes, France
on 15 September 2006.

Published August 2009.

5/2009 BAe 146-200, EI-CZO
at London City Airport
on 20 February 2007.

Published September 2009.

6/2009 Hawker Hurricane Mk XII (IIB), G-HURR
1nm north-west of Shoreham Airport, West Sussex
on 15 September 2007.

Published October 2009.

2010

1/2010 Boeing 777-236ER, G-YMMM
at London Heathrow Airport
on 28 January 2008.

Published February 2010.

2/2010 Beech 200C Super King Air, VQ-TIU
at 1 nm south-east of North Caicos Airport, Turks and Caicos Islands, British West Indies
on 6 February 2007.

Published May 2010.

3/2010 Cessna Citation 500, VP-BGE
2 nm NNE of Biggin Hill Airport
on 30 March 2008.

Published May 2010.

4/2010 Boeing 777-236, G-VIIR
at Robert L Bradshaw Int Airport
St Kitts, West Indies
on 26 September 2009.

Published September 2010.

5/2010 Grob G115E (Tutor), G-BYXR
and Standard Cirrus Glider, G-CKHT
Drayton, Oxfordshire
on 14 June 2009.

Published September 2010.

6/2010 Grob G115E Tutor, G-BYUT
and Grob G115E Tutor, G-BYVN
near Porthcawl, South Wales
on 11 February 2009.

Published November 2010.

7/2010 Aerospatiale (Eurocopter) AS 332L Super Puma, G-PUMI
at Aberdeen Airport, Scotland
on 13 October 2006.

Published November 2010.

8/2010 Cessna 402C, G-EYES and
Rand KR-2, G-BOLZ
near Coventry Airport
on 17 August 2008.

Published December 2010.

AAIB Reports are available on the Internet
http://www.aaib.gov.uk